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THE  
ACCOUNTANT'S HAND-BOOK.

Part First.

INTEREST STATES, DECIMAL CALCULATIONS,  
CONSIGNMENT AND JOINT ACCOUNTS, &c.

Part Second.

NOTES ON MONEY, FOREIGN EXCHANGES,  
AND PRICES.

BY

ROBERT COCKBURN MILLAR,

MEMBER OF THE SOCIETY OF ACCOUNTANTS IN EDINBURGH INCORPORATED BY ROYAL CHARTER,  
AND LECTURER ON PRACTICE OF COMMERCE IN THE HERIOT-WATT COLLEGE, EDINBURGH.

NEW EDITION.

J. MENZIES & CO., EDINBURGH AND GLASGOW.  
LONDON: SIMPKIN, MARSHALL & CO.

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1891.

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THE  
ACCOUNTANT'S HAND-BOOK





The following TABLE is based upon data derived chiefly from the *Economist, Commercial History and Review*, 1889, showing Wholesale Prices of Commodities in London and Manchester.—Average Six Years, 1845-50; selected dates, 1873, 1880, 1886, and 1890.

The numbers first occurring under each date are average prices at these dates—the black numbers are the corresponding Index Numbers. The *italics* in last column are corrected Index Nos. for 1890, giving effect to relative importance on the basis of consumption 1885.

	1845 to 1850.	1873, 1st January.	1880, 1st January.	1886, 1st January.	1890, 1st January.	Consumption in 1885, thousands.	Relative Import- ance.	Corrected Index No. 1890.
Coffee, . . . . .	49/-	171	74/-	151	91/-	930	·08	15
Sugar, . . . . .	29/- to 42/6	74	22/6 to 23/9	70	12/3	17,920	1·49	62
Tea, . . . . .	9½d.	100	13d.	141	5½d.	8500	·71	44
Tobacco, . . . . .	4½d.	195	8d.	180	10d.	3500	·29	64
Wheat, . . . . .	53/-	104	46/11	88	29/10	49,350	4·10	230
Butcher's Meat, . . . . .	3/5½	144	4/1	119	4/3	63,000	5·24	644
Cotton, . . . . .	6½d.	132	6½d.	110	5½d.			
Cotton Wool, Per-								
nambuco, . . . . .	8½d.	126	7½d.	83	5½d.	31,600	2·63	230
Cotton Yarn, . . . . .	9½d.	154	10½d.	110	9d.			
Cotton Cloth, . . . . .	13/5½d.	126	12/-	95	12/3			
Silk, Raw, . . . . .	11/6	169	15/6	135	10/9	1400	·12	14
Flax and Hemp, . . . . .	£38	98	£28, 10/-	78	£24, 10/-	23,000	1·91	176
Sheep's Wool, . . . . .	15d.	157	17½d.	117	18d.	600	·05	6
Indigo, . . . . .	3/9	169	7/10	205	4/6	5900	·49	40
Oils, . . . . .	£35, 16/8	118	£37, 15/-	106	£29, 7/6	19,650	1·64	189
Timber, . . . . .	72/-	127	75/6	105	82/9	3340	·28	21
Tallow, . . . . .	44/-	98	45/-	102	33/-	9600	·80	104
Leather, . . . . .	18d.	144	26d.	144	23½d.	4680	·39	25
Copper, . . . . .	£88	105	£71, 5/-	81	£56, 5/-	18,000	1·50	163
Iron, . . . . .	£8	141	£7½	92	£8½	1550	·13	11
Lead, . . . . .	£17½	124	£19½	112	£14½	1800	·15	18
Tin, . . . . .	£85½	171	£93½	109	£102½			
Total Index Number,	2200	2947	2538	2023	2236	264,320	22	2056

# THE ACCOUNTANT'S HAND-BOOK.

By R. C. MILLAR, C.A., EDINBURGH.

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Price 5s.

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## OPINIONS OF THE PRESS.

“Book-keepers of every class will welcome the appearance of Mr R. Cockburn Millar's *Accountant's Handbook*. It goes deeper into its matter than any of the ordinary manuals of book-keeping. It provides complete sets of forms of Interest States and Consignment, and Joint Accounts, and gives chapters on Decimal and Logarithmic Calculations, and gives a systematic treatment of Apportionment of Rent and Dividends. The work keeps throughout in view the practical necessities of accountants and book-keepers, whose study it will amply repay by lightening the labours and rendering them more effective.”—*Scotsman*.

“A volume which should be of much service to the members of the author's profession, and to all who are concerned in book-keeping or matters of calculation. It explains the principles of converting British money into decimals, supplies contracted methods for the multiplication and division of decimals, and contains numerous tables and rules for calculating interest, bankers' discount, equated times of payment, and so forth. The suggestions for improved and simplified methods of book-keeping contained in the latter part of the volume are thoroughly practical as well as scientific.”—*Scottish Leader*.

“This is a book in which the author sets forth fully, if not so clearly as non-experts might desire, those branches of arithmetic and book-keeping which are of chief importance in the ordinary work of the counting-house or bank, and which are not usually, or at any rate not thoroughly, treated in most of the text-books on book-keeping. The method adopted is to treat the subjects from the practical side, to make the explanations and rules as concise as possible, and to illustrate by working models. Thus actual business transactions are taken as examples, and this is the best feature in the work. Various forms of accounts-current, joint-accounts, bank-accounts, and interest-accounts are shown and exemplified, with the object of rendering the work useful and instructive, not only to law book-keepers, accountants, and bank clerks, but also to mercantile book-keepers. For these last the sections on Consignment and a Joint Account and the mode of entering such transactions in the merchants' books, are especially instructive. Chapters on the Apportionment Acts, Rents, Dividends &c., on the other hand, especially appeal to law book-keepers and accountants. Of general and valuable utility are the sections devoted to bankers' methods, cash credits, bill discounting, interest calculations, decimal tables, logarithm tables, income tax tables, &c. There is a great amount of labour represented in this work, and although the author's style might be more lucid, it will suffice for all who are not positive novices.”—*Glasgow Herald*.

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“This book is intended mainly to provide ‘a complete set of forms of interest states and of consignment and joint accounts,’ but the author has also added tables of decimals and logarithms, and useful notes on the Apportionment Acts, property and income tax, and other matters. Mr Millar evidently thoroughly understands what he is writing about, and is able to say what he has to say clearly and concisely. He has illustrated his book copiously—but not too fully—with examples, and has succeeded in putting together within a moderate compass a large amount of valuable information. The book is worthy of the attention of the professional accountant, as well as of book-keepers in general, and is calculated to be of service to both.”—*Manchester Guardian.*

“As a practical exposition of a multitude of details which come up daily for treatment by accountants, bankers, and lawyers, we know of no manual approaching to this for thorough usefulness. Mr Millar does not put it forth as a book for the instruction of the novice, but as a work of reference, to be always at hand to point out short and accurate methods for the work of daily life. But a great deal can be learned from it by the young banker or book-keeper, and we can thoroughly recommend its use. The chapter on Apportionments is, we think, of especial value.”—*North British Economist.*

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OPINIONS OF THE PRESS.

“Mr R. C. Millar, Edinburgh, has prepared a series of ‘Notes on Money, Foreign Exchanges, and Prices,’ for use in the class of Practice of Commerce in Heriot-Watt College, Edinburgh. The author opens with an explanation of ‘the chain rule,’ which affords a simple method of working out calculations in exchanges, price arbitrations, and other commercial transactions, and follows it up with explanations and examples to show how it can be applied to a wide variety of uses. The book contains a vast amount of information, and should be useful to all who are engaged in preparing young men for a commercial life, as well as for commercial men who are inclined to private study.”—*Glasgow Herald*, Nov. 22, 1890.

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# THE ACCOUNTANT'S HAND-BOOK.

## DECIMALS OF £1.

ALTHOUGH the people of Britain and most British colonies are denied the advantage of decimal money enjoyed by nearly the whole world beside, yet expert calculators have for a long time converted British money into decimals of £1, to facilitate their calculations. A rule for conversion may be deduced from the following table :—

£ s. d.	No. of Farthings.	Decimals of £1.	
1 - -	960	1·	
- 10 -	480	·5	5 florins.
- 5 -	240	·25	$2\frac{1}{2}$ "
- 2 -	96	·1	1 "
- 1 -	48	·05	$\frac{1}{2}$ " or 50 mils.
- - 6	24	·025	$\frac{1}{4}$ " or 25 mils.
- - 1	4	·00416	$4\frac{1}{6}$ mils.
- - $-\frac{1}{4}$	1	·0010416	1 mil. + $\frac{4\frac{1}{6}}{100}$ mils.

TO CONVERT £ s. d. INTO DECIMALS OF £1 BY INSPECTION.

*Approximate Rule.*—Place the £'s before the decimal point; in the first place, after the decimal point, insert florins or half the even number of shillings; fill the second and third places with the number of farthings in any odd shilling, pence, and farthings, adding thereto 1 if the number of farthings be 24, 2 if 48, and 3 if 72 or more (the number of farthings can never amount to 96, because 96 farthings = 2s. = ·1).

This operation is equivalent to reducing the whole of the shillings, pence, and farthings to farthings, and adding 1 for every 24 farthings.

The reason for adding 1 for every 24 farthings is, that instead of the £ being divided into 960 farthings, it is, in a decimal system, divided into 1000 mils. Now,  $960 : 1000 :: 24 : 25$ ; *i.e.*, every 24 farthings must be increased by 1, in order that 24 may bear the same ratio to 960 as 25 does to 1000.

*Limit of Error.*—By this rule the error can never amount to a farthing. If, however, the multiplier be large, the error may become considerable, and the following easily remembered rule gives the exact decimal:—

*Precise Rule.*—For the first place, take half the even number of shillings; reduce any odd shilling, pence, and farthings to farthings, adding 1 if there be 24 farthings, 2 if 48, and 3 if 72 or more for the second and third places; if the number for the second and third places be under 25, multiply it by 4, if above 25, multiply its excess above 25, 50, or 75 by 4, adding to the product, 1 if there be 24, 2 if 48, and 3 if 72 or more, and put the result in the fourth and fifth places; then treat this number as before: if under 25 multiply by 4, if above 25 multiply the excess above 25, 50, or 75 by 4, adding 1 if there be 24, 2 if 48, 3 if 72 or more, for the sixth and seventh places, and so on until the decimal terminates or repeats.

*Example*—

14/6½ TO THE DECIMAL OF £1.

1st place, . . . . .	Half of the shillings = $\frac{14}{2} = 7 = £\cdot7$	
2nd and 3rd places, .	$\left\{ \begin{array}{l} 6\frac{1}{2} = 26 \text{ farthings,} \\ \text{to which add 1} = 27 \end{array} \right\}$	= .027
4th and 5th places, .	$\left\{ \begin{array}{l} 27 - 25 = 2. \quad 2 \times 4 = 8, \\ \text{i.e., } 08 \end{array} \right\}$	= .00008
6th and 7th places, .	$\left\{ \begin{array}{l} 08 \times 4 = 32. \\ \text{to which add 1} = 33 \end{array} \right\}$	= .0000033
8th and 9th places, .	$\left\{ \begin{array}{l} 33 - 25 = 8 \\ 8 \times 4 = 32 \text{ add 1} = 33 \end{array} \right\}$	= .000000033
&c., &c.		

£·727083333

*i.e.*, £·727083

Care should be taken to insert the cipher when any two places are to be filled by one figure (*e.g.*, the fourth and fifth places in the above example).



## TABLE OF DECIMALS OF £.

<i>d.</i>		<i>s. d.</i>		<i>s. d.</i>	
$\frac{1}{4}$	·0010416	10	·0416666	$1/7\frac{3}{4}$	·0822916
$\frac{1}{2}$	·0020833	$10\frac{1}{4}$	·0427083	$1/8$	·0833333
$\frac{3}{4}$	·003125	$10\frac{1}{2}$	·04375	$1/8\frac{1}{4}$	·084375
1	·0041666	$10\frac{3}{4}$	·0447916	$1/8\frac{1}{2}$	·0854166
$1\frac{1}{4}$	·0052083	11	·0458333	$1/8\frac{3}{4}$	·0864583
$1\frac{1}{2}$	·00625	$11\frac{1}{4}$	·046875	$1/9$	·0875
$1\frac{3}{4}$	·0072916	$11\frac{1}{2}$	·0479166	$1/9\frac{1}{4}$	·0885416
2	·0083333	$11\frac{3}{4}$	·0489583	$1/9\frac{1}{2}$	·0895833
$2\frac{1}{4}$	·009375	1/	·05	$1/9\frac{3}{4}$	·090625
$2\frac{1}{2}$	·0104166	$1/\frac{1}{4}$	·0510416	$1/10$	·0916666
$2\frac{3}{4}$	·0114583	$1/\frac{1}{2}$	·0520833	$1/10\frac{1}{4}$	·0927083
3	·0125	$1/\frac{3}{4}$	·053125	$1/10\frac{1}{2}$	·09375
$3\frac{1}{4}$	·0135416	$1/1$	·0541666	$1/10\frac{3}{4}$	·0947916
$3\frac{1}{2}$	·0145833	$1/1\frac{1}{4}$	·0552083	$1/11$	·0958333
$3\frac{3}{4}$	·015625	$1/1\frac{1}{2}$	·05625	$1/11\frac{1}{4}$	·096875
4	·0166666	$1/1\frac{3}{4}$	·0572916	$1/11\frac{1}{2}$	·0979166
$4\frac{1}{4}$	·0177083	$1/2$	·0583333	$1/11\frac{3}{4}$	·0989583
$4\frac{1}{2}$	·01875	$1/2\frac{1}{4}$	·059375	2/	·1
$4\frac{3}{4}$	·0197916	$1/2\frac{1}{2}$	·0604166	3/	·15
5	·0208333	$1/2\frac{3}{4}$	·0614583	4/	·2
$5\frac{1}{4}$	·021875	$1/3$	·0625	5/	·25
$5\frac{1}{2}$	·0229166	$1/3\frac{1}{4}$	·0635416	6/	·3
$5\frac{3}{4}$	·0239583	$1/3\frac{1}{2}$	·0645833	7/	·35
6	·025	$1/3\frac{3}{4}$	·065625	8/	·4
$6\frac{1}{4}$	·0260416	$1/4$	·0666666	9/	·45
$6\frac{1}{2}$	·0270833	$1/4\frac{1}{4}$	·0677083	10/	·5
$6\frac{3}{4}$	·028125	$1/4\frac{1}{2}$	·06875	11/	·55
7	·0291666	$1/4\frac{3}{4}$	·0697916	12/	·6
$7\frac{1}{4}$	·0302083	$1/5$	·0708333	13/	·65
$7\frac{1}{2}$	·03125	$1/5\frac{1}{4}$	·071875	14/	·7
$7\frac{3}{4}$	·0322916	$1/5\frac{1}{2}$	·0729166	15/	·75
8	·0333333	$1/5\frac{3}{4}$	·0739583	16/	·8
$8\frac{1}{4}$	·034375	$1/6$	·075	17/	·85
$8\frac{1}{2}$	·0354166	$1/6\frac{1}{4}$	·0760416	18/	·9
$8\frac{3}{4}$	·0364583	$1/6\frac{1}{2}$	·0770833	19/	·95
9	·0375	$1/6\frac{3}{4}$	·078125	20/	1·0
$9\frac{1}{4}$	·0385416	$1/7$	·0791666	21/	1·05
$9\frac{1}{2}$	·0395833	$1/7\frac{1}{4}$	·0802083	22/	1·1
$9\frac{3}{4}$	·040625	$1/7\frac{1}{2}$	·08125		

TO CONVERT DECIMALS OF £1 INTO SHILLINGS, PENCE,  
AND FARTHING.

*Rule.*—Double the first place after the decimal point for the even shillings, from the second and third places deduct 50, if so much, for an odd shilling, the remainder (after discarding 1 if 25 or more) is farthings.

DECIMALS OF 1 OZ. TROY.

In a similar way the troy ounce may be decimalised, counting  $\frac{1}{2}$  grains like farthings, dwts. like shillings. Unfortunately, however, most of our weights and measures refuse to mould themselves so readily to the decimal scale.

MULTIPLICATION OF DECIMALS.

The short method of decimal multiplication has found most favour with practised calculators. By this method a result correct to the required number of decimal places is obtained without writing a single unnecessary figure. The following example will clearly indicate the *rationale* of the process:—

Multiply  $\cdot 3456$  by  $1\cdot 324$ .    Correct to 4 places.

$\cdot 3456$	$\cdot 345\ 6$
$1\cdot 324$	$423\cdot 1$
13824	3456 000
69120	1036 800
1036800	69 120
3456000	13 824
$\cdot 4575744$	$\cdot 4575\ 744$

If the above be examined, it will be seen that the results are the same, though in the second case the multiplier has been reversed. In both cases, discarding decimal points, the following have been added together:—

One thousand times	.	.	3456	=	3456000
Three hundred times	.	.	3456	=	1036800
Twenty times	.	.	3456	=	69120
And four times	.	.	3456	=	13824
					<hr/>
					4575744

*Rule.*—To multiply two decimals together, retaining  $n$  decimal places.

Reverse the multiplier, and place the multiplier under the multiplicand, so that what was its unit figure shall fall under the  $n$ th decimal place of the multiplicand, using ciphers if necessary, so that every figure of the multiplier shall have a figure or cipher above it.

Proceed to multiply, beginning each figure of the multiplier with the one which is immediately above it in the multiplicand; carrying, however, the nearest ten resulting from the multiplication of the figure to the right in the multiplicand.

Place the first figures of all the lines under one another, add as usual, and mark off  $n$  places from the right for decimals, prefixing ciphers when necessary.

*Examples.*

$$68.2036 \times 2.612180 \text{ } 00 \quad \text{Correct to 7 places of decimals.}$$

6302.86
<hr/>
1567308000
208974400
5224360
78365
15673
<hr/>
178.1600798

Correct to 7 places.

$$272\cdot8144 \times \cdot653045$$

$$272\cdot814400\ 0$$

$$540356\cdot0$$

---


$$1636886400$$

$$136407200$$

$$8184432$$

$$109126$$

$$13641$$

---


$$178\cdot1600799$$

Correct to 5 places.

$$532\cdot1569\ 213 \times \cdot0032$$

$$2300\cdot0$$

---


$$159647$$

$$10643$$

---


$$1\cdot70290$$

Correct to 7 places.

$$2\cdot4771213 \times 6\cdot00403$$

$$2\cdot477121\ 3$$

$$3\ 330400\cdot6$$

---


$$148627278$$

$$99085$$

$$743$$

$$74$$

$$7$$

---


$$14\cdot8727187$$

Correct to 5 places.

$$\cdot0416\ 6 \times 2\cdot5$$

$$5\cdot2$$

---


$$8333$$

$$2083$$

---


$$\cdot10416$$

## DIVISION OF DECIMALS.

*Rule.*—Equalise the number of decimal places in the dividend and divisor by annexing ciphers\* to that which has fewer places. Then further annex as many ciphers\* to the dividend as it is required to have decimal places; neglect the decimal point and operate as in common division, and mark off the required number of decimal places in the quotient.

*Example.*

$$31 \div \cdot0025$$

$$\cdot0025)310000(12400$$

$$25$$

---


$$60$$

$$50$$

---


$$100$$

$$100$$

\* Or the figures of a recurring decimal.

$36.459 \div .31465$  Correct to 3 places.

$$\begin{array}{r}
 31465)3645900.000(115.871 \\
 \underline{31465} \\
 49940 \\
 \underline{31465} \\
 184750 \\
 \underline{157325} \\
 274250 \\
 \underline{251720} \\
 225300 \\
 \underline{220255} \\
 50450
 \end{array}$$

#### SHORT METHOD OF DIVISION OF DECIMALS.

*Rule.*—Equalise the number of decimal places in the dividend and divisor by annexing ciphers\* to that which has fewer places. Proceed with the division. After the last figure in the dividend is exhausted, insert the decimal point in the quotient. If the number of decimal places required be greater than the number of figures in the divisor, annex ciphers,\* and continue to divide until the number of additional decimal places required is less than the number of figures in the divisor; then, instead of annexing a cipher,\* cut off a figure from the right of the divisor, and proceed to divide with this curtailed divisor, remembering, however, to carry the nearest ten from the multiplication of the figure struck off; and so on at each step, striking off another figure from the right of the divisor until the required number of decimal places is got.

*Note.*—If at the end of the equalised dividend there be ciphers, and if the number of figures required in the quotient, whether decimal or other, be less than the number of figures

\* Or the figures of a recurring decimal.

in the divisor, instead of carrying down a cipher, a figure may be struck off the divisor at each step, care being taken to insert the decimal point in the proper place.

Examples will make this rule quite clear:—

- (1.)  $31.92534 \div .5374$  Correct to 4 places of decimals.

$$\begin{array}{r} 5,3,7,4,0)3192534(59.4070 \\ 268700 \end{array}$$

---


$$505534$$

$$483660$$

---


$$21874$$

$$21496$$

---


$$378$$

$$376$$

---


$$2$$

- (2.)  $673.1489 \div .41432$  Correct to 3 places of decimals.

$$\begin{array}{r} 4,1,4,3,2)67314890(1624.708 \\ 41432 \end{array}$$

---


$$258828$$

$$248592$$

---


$$102369$$

$$82864$$

---


$$19505$$

$$16573$$

---


$$2932$$

$$2900$$

---


$$32$$

$$33$$

3.)  $1237.45 \div 1.6347$  Correct to 2 places of decimals.

$$\begin{array}{r} 1,6,3,4,7)12374500(756.99 \\ 9316 \\ 1143 \\ 163 \\ 16 \\ 1 \end{array}$$

(4.)  $.3215 \div .69541$  Correct to 5 places.

$$\begin{array}{r} 6,9,5,4,1)321500(.46231 \\ 43336 \\ 1611 \\ 220 \\ 11 \\ 4 \end{array}$$

(5.)  $4.00416 \div 16.3$  Correct to 6 places.

$$\begin{array}{r} 16.33333)4.004166(.245153 \\ 737500 \\ 84167 \\ 2501 \\ 868 \\ 52 \end{array}$$

(6.)  $.083 \div .30103$  Correct to 5 places.

$$\begin{array}{r} .30103).083333(.27683 \\ 23127 \\ 2055 \\ 249 \\ 8 \end{array}$$

## LEAP YEAR.

By the Julian calendar (Old Style) every year divisible by 4 was a leap year (366 days), so that on the average every year was reckoned too long by about 11 minutes (365 days 6 hours instead of 365 days 5 hours 49 minutes nearly).

In 1582 the error amounted to about 10 days, and Pope Gregory XIII. decreed that that year should have only 355 days; and further, in order to reduce the subsequent error to a minimum, he proclaimed that years denoting complete centuries, although divisible by 4, should not be leap years unless the denoting figures were also divisible by 4. Thus 1600 and 2000 are leap years; 1700, 1800, 1900, and 2100 are not leap years.

The Gregorian calendar (New Style) was not adopted in Britain until 1752, in consequence of religious prejudice. By this time the error amounted to about 11 days, when it was enacted by 24 Geo. II. c. 23 that the 3rd of September of that year should be called the 14th September.

The Russians, who still use the Old Style, are now 12 days behind, so that a Russian letter or bill, dated the 6th December, means the 18th December of our time.

Banks charge and allow interest for days, so that in leap years they receive and pay interest for a year and a day.

---

## INTEREST.

Interest is what is paid for the use of capital. The rate of interest varies as the amount of capital available, and the demand for it. It also varies with the credit of the borrower, because it has included in it a premium of insurance against loss of the principal sum.



Interest is usually expressed by a rate per cent. per annum, 5 per cent. signifying that £5 (interest) will be charged for the use of £100 (principal) for one year, and the interest of any sum for any time at a given rate is directly proportional to the principal and to the time.

Interest is found by multiplying the rate by the principal divided by 100, and by the time divided by 1 year.

$$\text{i.e., rate} \times \frac{\text{Principal sum.}}{100} \times \frac{\text{Number of days.}}{365} = \text{Interest.}$$

The interest of £509 for 153 days at 5 per cent. is found thus:—

$$5 \times \frac{509}{100} \times \frac{153}{365} = \frac{5 \times 509 \times 153}{36,500}$$

It is usual to multiply both numerator and denominator of this fraction by 2, because the denominator thus obtained (73,000) is a simpler one for purposes of division than 36,500, and the numerator also is simplified, if, as frequently happens, the rate per cent. has a  $\frac{1}{2}$  in it.

Hence the ordinary rule—Multiply the principal by the number of days and by double the rate per cent., and divide by 73,000.

The above example now stands thus:—

$$\frac{10 \times 509 \times 153}{73,000} = \frac{509 \times 153}{7,300} = 10.668 = \text{£}10, 13\text{s. } 4\frac{1}{2}\text{d.}$$

$$\begin{array}{r} 153 \\ 509 \\ \hline 1377 \\ 765 \\ \hline 73)778.77(10.668 \\ 487 \\ 497 \\ 590 \\ 6 \end{array}$$

To divide by a constant divisor, say 73, it is useful to commit to memory, or to have for reference, a table of all the results of multiplication of 73 by 1, 2, 3, 4, &c., thus:—

1	73
2	146
3	219
4	292
5	365
6	438
7	511
8	584
9	657

In working the division it saves time simply to write the result after subtraction, as in the last example.

Instead of dividing by 73,000, that is, taking  $\frac{1}{73000}$ th of the product of the principal by the number of days and by the double rate, some accountants prefer to multiply by  $\cdot 0000137$ , which gives an approximate result too great to the extent of one penny in every £40 of interest.

The multiplication may be effected in one of the following ways:— $778770 \times \cdot 0000137$ .

1st Ordinary method.	2nd Short method. Correct to 3 places.	3rd Method, by fractional parts.
778770	778770·00 0	100 = 77877000
·0000137	73100 00·0	$33\frac{1}{3} = \frac{1}{3} = 25959000$
<hr/>	<hr/>	$3\frac{1}{3} = \frac{1}{10} = 2595900$
5451390	7788	$\frac{1}{3} = \frac{1}{10} = 259590$
2336310	2336	<hr/>
778770	545	137      10·6691490
<hr/>	<hr/>	
10·6691490	10·669	
£10, 13s. 4 $\frac{3}{4}$ d.		

To shorten the last method it is customary to omit the last two figures, taking merely the product and one-third of it, one-tenth of that third, and one-tenth of that tenth, adding these and striking off five places of decimals.

## DISCOUNT.

The present value of a debt, due at a future time, is the cash amount you could obtain for it to-day. Discount is the difference between the amount of a debt due at a future time and its present value. It is usually expressed as a percentage. Commercial discount is generally a certain rate per cent. on the amount due. If goods be sold for £100, payable in 14 days, subject to 3 per cent. discount, a settlement would be effected by the payment of £97 on the due date.

Discount may also be quoted, as by bankers, at a rate per cent. per annum. Merchants and bankers calculate, at the quoted rate, interest on the amount of the debt for the given time. Banker's discount is therefore forehand interest, and is greater than the true discount by the amount of the interest on the true discount for the time. The true or mathematical discount is interest upon the present value of the debt at the given rate for the given time.

The true discount of  $\left\{ \begin{array}{l} £105 \\ £100 \end{array} \right\}$  for one year at 5 per cent. is  $\left\{ \begin{array}{l} £5 \\ £4, 15s. 2\frac{3}{4}d. \end{array} \right\}$ , for  $\left\{ \begin{array}{l} £105 \\ £100 \end{array} \right\}$  would repay a loan of the difference  $\left\{ \begin{array}{l} £100 \\ £95, 4s. 9\frac{1}{4}d. \end{array} \right\}$  at the end of the year, with interest on the loan at 5 per cent.

*Rule for finding the True Discount.*—As the amount of £100 for the given rate and time is to the interest of £100 for the same, so is the given debt to the discount.

If, however, a banker discount a bill for £105 at 5 per cent. on 4th January, due 1/4 January following, his charge would be £5, 5s., and he would credit the customer with £99, 15s. as the proceeds of the bill. In short, he charges interest upon the interest which he retains as well as interest upon the amount he lends. The real discount rate charged is thus in excess of the nominal rate quoted for discounting bills.

*Example.*—A. B. owed to C. D. £2000 on 31st December 1888, and desires one year's delay in payment, agreeing to give a bill which C. D. may discount, and thus get £2000 from his banker. If the rate be 5 per cent., for how much ought the bill to be? One year's interest on £2000 at 5 per cent. is £100; but £2100 discounted for one year would yield only (£2100 - 105) £1995, or £5 short. To ascertain the amount for which to draw, the following proportion must be worked out, viz. :—

If £100 yield £95, how much will be required to yield £2000?

$$\begin{array}{rcl}
 95 : 2000 :: 100 : \text{Bill.} \\
 100 \\
 \hline
 95)200000(2105\cdot263 & = & \text{£}2105 \quad 5 \quad 3\frac{1}{4} \\
 500 & & \\
 250 & & \\
 600 & & \\
 300 & & \\
 15 & & 
 \end{array}$$

A simple way of getting at the same result is as follows :—

A. B.'s debt is . . . . .	£2000	0	0
Interest thereon for one year, at 5 per cent. . . . .	100	0	0
Interest on £100 for one year, at 5 per cent. . . . .	5	0	0
Interest on £5 for one year, at 5 per cent. . . . .	0	5	0
Interest on 5s. for one year, at 5 per cent. . . . .	0	0	3
	£2105	5	3

Many merchants, however, would draw only for the smaller sum of £2100, being the amount of the debt and the interest, though it is obvious that in that case they would not realise the full amount of their debt (£2000), but only £1995 if the bill were discounted at once.

## DEPOSIT RECEIPT INTEREST.

Bank Profits are chiefly obtained through borrowing from the public at a low rate and investing at a higher rate, by discounting bills and granting loans to customers. In England interest is not usually allowed on customers' current account credit balances, while in Scotland 1 per cent. is now allowed on the minimum monthly balances on such accounts. Interest at a higher rate is allowed on deposits for a month or longer, the rate varying with the Bank of England minimum rate of discount. The average Deposit Receipt rate over the past fifty years has been slightly over  $2\frac{1}{2}$  per cent., the maximum reaching 6 per cent. for a few days in 1873, when business was brisk and prices high, and the lowest rate  $1\frac{1}{2}$  per cent., occurring recently during the period of depression and low prices.

The Scotch banks have for many years adopted a very clever labour-saving device for the calculation of interest on deposit receipts. It is suitable to the case of fixed sums at frequently varying rates, and enables the calculator, by one calculation, to ascertain the interest for any period, no matter how often the rate has altered in the interval.

The principle of the method may be illustrated thus:—5 days' interest at 2 per cent. is the same as 2 days' interest at 5 per cent.; 15 days' interest at 2 per cent. is equal to 6 days' interest at 5 per cent.; 15 days' interest at 3 per cent. is equal to 9 days' interest at 5 per cent. In short, any interest calculation can be reduced to a 5 per cent. rate by altering the time, viz., by multiplying the time by the rate and dividing the product by 5. The same result is got if you multiply the time by twice the rate and divide the product by 10. Since multiplication is merely continuous addition, if you add together in a table double the rate current for each day and divide by 10 (which is done by inserting a decimal point before the last figure), you obtain a series of numbers, which

numbers represent the equivalent time at 5 per cent. to the time during which the table runs at the various rates.

To construct the table, then, commencing from any date, say 1st January 1884, when interest was at 2 per cent., as no interest is allowed for the day of deposit, you enter nothing against 1st January, but against 2nd January you place  $\cdot 4$  being twice 2 divided by 10; against 3rd January . . .  $\cdot 8$

4th	„	.	.	1·2
5th	„	.	.	1·6
6th	„	.	.	2·
7th	„	.	.	2·4
8th	„	.	.	2·8
9th	„	.	.	3·2
10th	„	.	.	3·6
11th	„	.	.	4·

From the 1st to the 11th is a period of 10 days, which at 2 per cent. is the same as 4 days at 5 per cent.

The rate continued at 2 per cent. till February 7th, when it was raised to  $2\frac{1}{2}$  per cent.

Opposite 7th February the number was	$37 \times 4$	=	14·8
and on 8th „ by the addition of $\cdot 5$ became			15·3
9th „ „ „			15·8
and so on 10th „ „ „			16·3
11th „ „ „			16·8

From the 8th January when the number was 2·8, to the 11th February when it was 16·8, the difference is 14, indicating that 14 days at 5 per cent. is equal to 30 days at 2 per cent. + 4 days at  $2\frac{1}{2}$  per cent.

On pages 18 and 19 is a partial table for 1889, which may be completed and kept up by daily entries:—

Rates, 4th October 1888 to 10th January 1889,	$3\frac{1}{2}$	per cent.
„ 10th January to 24th January,	$2\frac{1}{2}$	„
„ 24th January to 31st January,	2	„
„ 31st January to 29th August,	$1\frac{1}{2}$	„
„ 29th August to 26th September,	$2\frac{1}{2}$	„
„ 26th September to	$3\frac{1}{2}$	„

It is used by taking out the numbers from the table opposite the date of deposit and date of withdrawal, and calling the difference days, turning up any 5 per cent. interest table for said number of days, and taking out the interest opposite the amount of the sum on deposit. The interest for the fraction of a day must be added; and although tables of interest corresponding to fractions of a day are in use, bankers are accustomed to employ the more ready method of taking the interest of one-tenth of the principal for ten times the decimal—that is for a number of days represented by the figure in the decimal place. For instance, if a banker required to find the interest of £1000 for 229·8 days at 5 per cent., he takes out from his tables the interest on £1000 for 229 days, and on £100 for 8 days, and the addition gives the interest required.

Should there be no interest tables at hand, the interest may be found by multiplying the number extracted from the table by the principal, and dividing the product by 7300.

The number obtained from the table is the product of the days by the double rate divided by 10, and by the ordinary rule of interest, the remaining operation to obtain the interest is the division by 7300.

The Scotch banks, in calculating interest on deposit receipts, discard the odd shillings and pence in the principal. They also deduct the penny inland revenue duty which is stamped upon deposit receipts to cover the depositor's discharge. The bank's receipt to the depositor for the money is free of stamp duty. Auditors ought to have their own tables for checking deposit receipt interests, but this ought not to cause them to neglect to require production of the banker's certificate of the uplifted deposit, for thus only can the auditor be satisfied that the money was actually in bank during the period stated.

## DEPOSIT RECEIPT RATES, from 31st December 1888—SCOTCH BANKS.

1889.		January	February	March	April	May	June
	1	.7	17.1	25.5	34.8	43.8	53.1
	2	1.4	17.4				
	3	2.1	17.7				
	4	2.8	18.				
	5	3.5	18.3				
	6	4.2					
	7	4.9					
	8	5.6					
	9	6.3					
	10	*7.					
	11	7.5					
	12	8.					
	13	8.5					
	14	9.					
	15	9.5					
	16	10.					
	17	10.5					
	18	11.					
	19	11.5					
	20	12.					
	21	12.5					
	22	13.					
	23	13.5					
	24	*14.					
	25	14.4					
	26	14.8					
	27	15.2					
	28	15.6	25.2				
	29	16.					
	30	16.4			43.5		61.8
	31	*16.8		34.5		52.8	

*Examples.*

I. Required Interest on £500 Deposit Receipt, dated 1st January 1889, uplifted 3rd February 1889.

Opposite 3rd February 1889, per table, . . . . . 17.7  
 " 1st January, . . . . . 7

Difference, . . . . . 17.0

and in a 5 per cent. interest table under 17 days, opposite £500 is found . . . . . £1 3 3½

or— 
$$\frac{£500 \times 17}{7300} = \frac{8500}{7300} = £1.164$$

\* Indicates change of rate.



Time equalised to 5 per cent. from Day to Day.

July	August	Sept.	October	Novem.	December		1889.
62·1	71·4	81·3	97·3			1	
						2	
						3	
						4	
						5	
						6	
						7	
						8	
						9	
						10	
						11	
						12	
						13	
						14	
						15	
						16	
						17	
						18	
						19	
						20	
						21	
						22	
						23	
						24	
						25	
		*93·8				26	
		94·5				27	
		95·2				28	
	*79·8	95·9				29	
	80·3	96·6				30	
71·1	80·8					31	

II. Deposit Receipt for £1000, dated 26th January 1889, uplifted  
1st August 1889.

Opposite 1st August 1889, per table, . . . . . 71·4

" 26th January, . . . . . 14·8

Difference, . . . . . 56·6

Interest for 56 days at 5 per cent. on £1000, . . . £7 13 5

Interest for 6 days at 5 per cent. on £100, . . . 0 1 7 $\frac{3}{4}$

or— 
$$\frac{£1000 \times 56·6}{7300} = \frac{56600}{7300} = £7·753. \quad £7 \ 15 \ 0\frac{3}{4}$$

## REVERSE METHOD.

The Reverse Method is used by banks at balancing time to calculate interest on deposit receipts from their date to the day of the balance:—

If 1st January 1875 be the day of the balance, and the		interest back to 30th December 1874 were		.	3	per cent.
	18th November 1874	"	.	.	2 $\frac{1}{2}$	"
Then opposite	31st December, place	.	.	.	.	·6
"	30th	"	.	.	.	1·2
"	29th	"	.	.	.	1·7
"	28th	"	.	.	.	2·2
"	27th	"	.	.	.	2·7
"	11th	"	.	.	.	10·7

The clerk making up the balance thus requires merely to take out the number opposite the date of the deposit receipt, and ascertain the interest at 5 per cent. for that number of days on the amount.

INTEREST ON BANK CASH-CREDITS AND  
OVERDRAFTS.

The bank ledger contains an account in each customer's name, which is credited with all he pays in and debited with all he draws out. It contains a date column, Dr. and Cr. money columns, a column for the balance at the end of each day, and whether Dr. or Cr., and Dr. and Cr. interest columns.\*

Into the Dr. interest column there is extended the balance on each day, including Sundays, and the summation of all these Dr. balances gives the equivalent of the product of the principal by the number of days. These products must be

\* See form, page 29.

summed for each rate separately, and multiplied by double the rate, and divided by 73,000. There are tables in use for converting these products at any rate required.

#### INTEREST ON MINIMUM MONTHLY BALANCES.

The current deposit accounts of bank customers are kept in the same way as has been described under the head cash-credit accounts. Each calendar month stands by itself, and if at the end of any day during any month the customer have a debit balance, he receives no interest on sums at credit during that month, and nothing is entered in the Cr. interest column, but entries are made in the Dr. interest column for the debit balances. If the balance be Cr. during the whole month, the smallest Cr. balance during the month is selected, and multiplied by the number of days in the month, and the product is extended into the Cr. interest column. If the rate of interest be altered, the product must be divided and the amount at each rate ascertained. The products are then valued according to the rates current, either by reference to the interest tables, or by multiplying by twice the rate and dividing by 73,000.

---

#### ACCOUNTS-CURRENT.

An account-current is the account transmitted by a merchant to his correspondent, showing the present state of the accounts between them. It is a copy of the merchant's ledger account in name of the correspondent.

It contains on the left, or Dr. side, the sums due by the correspondent to the merchant, and on the right, or Cr. side, the sums due by the merchant to the correspondent.

The term Dr. is placed on the left hand side of a ledger account, to indicate that the person whose name heads the account is debtor, or owes to the person or company whose ledger it is, the sum placed in the Dr. column.

The term Cr. is placed on the right hand side of a ledger account, to show that the person whose name heads the account is creditor by, or entitled to credit for, the sum placed in the Cr. column. Thus, in accounts-current the correspondent is Dr. to the merchant rendering the account for all the sums on the left hand side of the account, and is creditor by the merchant for all the sums on the right hand side of the account; the merchant's position is exactly the converse of this, *i.e.*, when the correspondent is Dr., the merchant is Cr.

These accounts-current may be stated in ordinary ledger form, and may be accompanied by a periodical interest state, or they may contain interest columns, and so form a combined account-current and interest account.

The term account-current is also used to denote an operative account with a bank, or a cash account between an agent and client.

In all properly regulated businesses prompt payments are strictly required, and all sums not paid when due carry interest.

The book-keeper, in preparing accounts-current to a certain day, calculates interest on goods, bills, or charges from the day on which they fall due or are paid, and on cash from the day of receiving or paying the same; and if the settlement is to embrace sums not yet due on the day fixed for settling, these sums must be discounted. The resulting balance of interest is entered in the account-current.

## AVERAGE DUE DATES OR EQUATED TIME OF PAYMENT.

When merchants supply goods, the rule is to have definite terms fixed for settlement, such as by cash on delivery, or in 7 or 14 days, or in a month, or by a bill at two, three, or four months.

If a debt be not paid when due, interest is charged from the due date until payment be made.

It sometimes happens that, instead of drawing half a dozen bills for six different consignments due at different dates, one bill is drawn from the average due date or equated time of payment.

The average due date is an intermediate date at which the interest on the sums due previous thereto would exactly balance the interest on the sums due thereafter.

In settling joint-adventure accounts it is usual, in order that interest calculations may be simplified, to find the average due date of the account sales.

*Rule.*—To find the equated time of payment, or average due date of a number of sums due on different dates, let the earliest due date be taken as the starting point. Multiply each sum by the number of days between the starting point and its due date, add these products, and divide their total by the total of the sums; the quotient is the number of days between the starting point and the average due date, which can consequently be determined.

### *1st Example.*

T. Jones sold R. Ross goods, payable as follows:—

1st January, £865, 4s.; 18th January, £1027, 12s.; and on the 16th February, £1132.—Required the average due date.

Jan. 1,	865·2	0	
" 18,	1027·6	× 17	17469·2
Feb. 16,	1132·	× 46	52072·
	<hr/>		<hr/>
	3024·8		69541·2(23
			9045 2

The average due date of these three sums is therefore the 24th January. That this is so may be proved thus:—

					Interest at 5 %.	
Jan. 1,	£865	4	0	×	23	£2 14 6
" 18,	1027	12	0	×	6	0 16 10
Feb. 16,	1132	0	0	×	23	£3 11 4
						<hr/>
						£3 11 4
						<hr/>
						£3 11 4
						<hr/>

*Example 2.*

T. Jones held R. Ross's bills, due as follows:—

January 15th, £100; January 31st, £100; February 7th, £100; February 15th, £100; February 28th, £100, and March 31st, £500. R. Ross wished to grant, in exchange, one obligation for £1000, as from the average due date.—Find the equated time of payment.

*Proof.*

				Days to 5th Mar.	Product.
Jan. 15,	£100			49	4900
" 31,	100	16	1600	33	3300
Feb. 7,	100	23	2300	26	2600
" 15,	100	31	3100	18	1800
" 28,	100	44	4400	5	500
					<hr/>
					13,100
Mar. 31,	500	75	37500	26	13,000
	<hr/>		<hr/>		<hr/>
	1000		48900		

The equated time of payment is 49 days after the 15th January = 5th March.

*Note.*—It may be observed that this mode of calculation is liable to the same objection as the banker's discount. Interest on sums past due is not fairly compensated by interest on amounts not yet due.

## AVERAGING CURRENT ACCOUNTS.

To find the equated time of payment of the balance of an account-current.

Let the earliest date in the account be used as a starting point from which to reckon the interval up to the date of each subsequent entry. Multiply each sum on the debit side by the number of days from the starting point to its due date, and add the products together. Treat the credit side in a similar way. Find the difference of the sums of the products, and divide that difference by the balance on the account; the quotient will be the number of days at which the balance can be settled without interest,—*after* the starting-point if the balance fall on the side which has the larger sum of products (Ex. 1)—*before* the starting-point if the balance fall on the side which has the smaller sum of products (Ex. 2).

*Example 1.* Starting Point May 31st.

Dr.	A. in Account-Current with B.								Cr.
June 15,	£30	15	450	May 31,	£30				
Aug. 5,	35	66	2310	July 21,	20	51	1,020		
Nov. 10,	50	163	8150	Aug. 30,	40	91	3,640		
				Balance	25				
				Balance.					
				Int. Nos.			6,250		
	£115		10,910		£115		10,910		
			25)6250(						
			4						
			250·00						

250 days after 31st May = 5th February.

*Alternatively.*—The average due date of the debtor side is  $\frac{10910}{115} = 95$  days = 3rd September.

The average due date of the creditor side is  $\frac{4660}{90} = 52$  or 22nd July.

If £90 be received on loan from A. on 22nd July, and the debtor pay £115 on 3rd September, how long is A. entitled to retain the balance of £25, so as to equalise the interest? A. is entitled to retain the £25 till 5th February, because the interest of £90 from 22nd July to 3rd September (43 days) = the interest of £25 from 3rd September to 5th February (155 days).

*Example 2.*

A. lends to B. £1000 on 20th January. B. repays £100 on February 20, and £200 on March 2. A. pays to B. £100 on March 30, and B. repays £300 on August 5.

Starting point, January 20.

Dr.	A. in a/c with B.				Cr.
1889.				1889.	
Feb. 20.	£100	31	3100	Jan. 20.	£1000
Mar. 2.	200	41	8200	Mar. 30.	100 69 6900
Aug. 5.	300	197	59100	Balance of	
Balance,	500			Interest Nos.,	63500
	<u>£1100</u>		<u>70400</u>		<u>£1100 70400</u>

$$500)63,500 = \frac{63,500 \times 2}{1000} = 127$$

127 days before January 20 is 15th September 1888 ;

or alternatively £600 Dr. averaged due date  $\frac{70400}{600} = 117$  days = 17th May.

" 1100 Cr. "  $\frac{6900}{1100} = 6$  days = 26th Jan.

If £1100 be received on loan on 26th January from A., and B. repay £600 on dates averaging 17th May, at what date ought B. to have provided A. with £500 (the balance), so that the interest would have been equalised? B. ought to have paid to A. £500 on 15th September 1888, because the interest of £500, from 15th September 1888 to 26th January 1889 (133 days), is equal to the interest of £600 from January 26 to May 17 (111 days).



INTEREST STATES.

If it be required to find the interest on 50 sums for different periods, but all at the same rate, 49 multiplications by the double rate, and as many divisions by 73,000 may be saved thus:—

*Rule.*—Multiply each balance by the number of days for which it has been due, add these products together, multiply this total by the double rate, and divide the result by 73,000.

*Examples.*

1. A. B. in a/c with C. D.

Dr.		Cr.
1889.		1889.
Jan. 15.	To Cash, £160	Mar. 22. By Cash, £50
Mar. 12.	To Do., 36	May 16. By Do., 115
June 15.	To Do., 40	

Date.	A. B.	Dr. and Cr.	Days.	Product.
1889.				
Jan. 15.	To	£160	× 56	8960
Mar. 12.	To	36		
		<hr/>		
		Dr. £196	× 10	1960
Mar. 22.	By	50		
		<hr/>		
		Dr. £146	× 55	8030
May 16.	By	115		
		<hr/>		
		Dr. £31	× 30	930
June 15.	To	40		
		<hr/>		
		Dr. £71	× 16	1136
				<hr/>
July 1.	To Int. at 5 per cent.	2 17 7		7300)21,016(2·879
		<hr/>		641 = £2 17 7
		Dr. £73 17 7		576
		<hr/>		65

2. There was due to A. B. on 12th August £170, payment of which he agreed to accept by instalments as follows, with interest at 5 per cent.

Date.	A. B., Dr. and Cr.	Days.	Products.
Aug. 12.	By £170	× 37	6290
Sept. 18.	To 54		
	By £116	× 29	3364
Oct. 17.	To 56		
	By £60	× 28	1680
Nov. 14.	To 60		
			7300)11334(1·552 = £1 11 0½
			403
			384
			19

Some merchants prefer the following method of obtaining the daily balance and interest numbers. It is very compact.

				Balances.	Days.	Products.	
						Dr.	Cr.
1889.							
April	3.	To Goods, £155		Dr. £155	21	3255	
"	24.	By Cash, £63		Dr. 92	7	644	
May	1.	To Goods, 34		Dr. 126	11	1386	
"	12.	By Cash, 193		Cr. 67	13		871
"	25.	To Goods, 15		Cr. 52	18		936
June	12.	To Goods, 62		Dr. 10	18	180	
"	30.	To Interest, 10s.					
"	"	By Balance, 10, 10s.				5465	1807
						1807	
		£266, 10s.	£266, 10s.				
						3658	
"	"	To Balance, £10, 10s.				10	
						73,000)36,580(·501	

The next page shows a bank ledger account :—

Date.	To or By.	Individual Entries.	Cheques.			Credits.			Dr. or Cr.	Balances. Amount.			Days.	Dr. Product.	Valua- tion.	Cr. Product.	Valua- tion.
1889.	30	Brot. for., £	£7,351	17	5	£7,458	19	11	Cr.	£107	2	6	181	190		8,015	
June	1		8	6	8				"	98	15	10					
July	2					1,011	15	8	"	1,110	11	6					
"	3		1,093	6	3				"	17	5	3					
"	5					219	12	10	"	236	18	1	5				
"			296	0	0				"	59	1	11	7	413			
"	12								Dr.	39	3	1	4				
"	16		975	12	6	98	5	0	Cr.	936	9	5	9	8,424			
"	25					181	15	0	Dr.	754	14	5	1	755			
"	26					1,550	0	0	Cr.	795	5	7					
"			510	3	4				"	285	2	3					
"	31		112	9	1				"	172	13	2	5				
Aug.	1					193	17	1	"	366	10	3					
"	6					266	14	8	"	633	4	11					
"			450	0	0				"	183	4	11					
"	7		23	6	10				"	159	18	1					
"	8		24	2	7				"	135	15	6					
"	9								"	263	16	5					
"	10					128	0	11	"	348	16	5				2,108	
"	12					85	0	0	"	78	16	5	31				
"	16		270	0	0				"	68	16	5					
"	16		10	0	0				"	79	3	10				660	
"	27					10	7	5	"	22	6	10	30				
Sept.	2		56	17	0				"	115	14	8					
"	12					93	7	10	"	25	5	9					
"	20		90	8	11				"	1,022	5	9					
"	26					997	0	0	"	1,002	5	9					
"	30		20	0	0				"	1,001	2	2					
"			1	3	7				"								
"			1,001	2	2				"								
		Interest,							"								
		Balance,							"								
			£12,294	16	4	£12,294	16	4					273	5½%	£1 9 6	1% 10,783	5/11
Sept.	30	Balance,				£1,001	2	2	Cr.	1,001	2	2		Dr.	1 3 7		

This Form is suitable for any Ledger Account on which Interest falls to be calculated.

As an illustration of the use of short methods, it may be mentioned that bank accountants sometimes value one per cent. interest on minimum monthly balances, at one penny for every five pounds per month. This would be correct if all the months were equal; and in small accounts the errors from this cause are slight, and tend to balance one another.

In calculating interest on many sums for different periods at different rates, the frequent division by 73,000 may be avoided thus:—

*Rule.*—Multiply each sum by the number of days for which it has been due and by the double rate, add the products, and divide the total by 73,000.

When there are both debit and credit items or balances on which interest falls to be calculated, separate columns are used for the products of the debtor sums and the creditor sums. When the interest on debtor and creditor items is at the same rate, the difference of the total products is multiplied by double the rate and divided by 73,000.

When the interest is at certain rates on the debtor items and at other rates on the creditor items, the multiplication by the double rate must be carried out separately, for the debtor products at each rate and for the creditor products at each rate, and the difference between the ultimate debtor and creditor products being divided by 73,000, will give the interest.

These cases are exemplified in the following states, which have been prepared to show the various methods of stating interest accounts commonly met with in business.

An attempt has also been made throughout the illustrations to elucidate the principles regulating the heading of accounts current and the use of the words Dr. and Cr. Some of the accounts have been repeated in different forms, in order to demonstrate the necessity of having a clear conception of the meaning of Dr. and Cr. with reference to the heading of accounts.

## METHODS OF STATING INTEREST ACCOUNTS.

### EXAMPLE I.

On 1st January 1889 A. Bow advanced to C. Dow, in cash, £50; on 12th January, £30; on 15th January, £25; on 14th February, £45; and on 27th February, £50. Calculate interest at 5 % to 31st March, and show amount, with interest, due on that date, and the settlement thereof.

*1st Method.*—Account in the form of

C. Dow in a/c with A. Bow

(that is C. Dow's account as appearing in A. Bow's Ledger).

PERIODICAL INTEREST STATE BALANCED *de die in diem*.\*

Date.	C. Dow.	Dr	Days	Product.
1889 Jan. 1	To Cash (from A. Bow), £	50	11	550
„ 12	To Do. . . . .	30		
„ 15	To Do. . . . .	To £ 80 25	3	240
Feb. 14	To Do. . . . .	To £ 105 45	30	3150
„ 27	To Do. . . . .	To £ 150 50	13	1950
		To £ 200	32	6400
				12290
Mar. 31	To Interest, . . . .	1 13 8		10
„ „	To £ 201 13 8		73,000)	122900(1·683
	By Cash, . . . . .	201 13 8		499 = £1 13 8
				610
				26

\* From day to day.

2nd Method.—Account in the form of

A. Bow in a/c with C. Dow

(that is A. Bow's account as appearing in C. Dow's Ledger).

PERIODICAL INTEREST STATE BALANCED *de die in diem*.

Date.		A. Bow.	Cr.	Days.	Interest as Calculated.	Interest per Tables.
1889.						
Jan.	1	By Cash advanced to				
		C. Dow, .	£ 50			
	12	" Do., .	30	11	1/6	1/6
		By £	80	3	-/8	-/7 $\frac{3}{4}$
	15	" Do., .	25			
		By £	105	30	8/7 $\frac{1}{2}$	8/7 $\frac{1}{4}$
Feb.	14	" Do., .	45			
		By £	150	13	5/4 $\frac{1}{4}$	5/3 $\frac{3}{4}$
	27	" Do., .	50			
		By £	200	32	17/6 $\frac{1}{4}$	17/6 $\frac{1}{4}$
Mar.	31	" Interest,	1 13 8			
					£1 13 8	£1 13 7
		By £	201 13 8			
	"	To Cash, .	201 13 8			

*Note.*—The interest calculation exemplified in the first method can not only be more expeditiously performed than by the use of interest tables as in the second, but is more accurate, because, as shown there, the fractional errors make a difference of 1d., and where there are many sums this error might amount to much more.

The column headed 'Interest as Calculated,' is introduced merely to show the difference between it and interest as taken from the table, and is never used practically in framing periodical interest states.

## EXAMPLE II.

On 3rd May 1889, A. Bow sold goods to C. Dow, invoiced at £50, 4s. 6d. for cash in 14 days, due 17th May, and on the 12th May another parcel invoiced at £63, 15s. 6d., on the same terms. C. Dow failed to pay, and was sequestrated on 30th June. How much does A. Bow claim for?

*3rd Method.* C. Dow, *Dr.* to A. Bow.

Date.						Days.	Product.
1889.							
May	3	To Goods due 17th					
		May, . . . . .	£ 50	4	6	44	2,200
"	12	" Do. due 26th May,	63	15	6	35	2,240
							<hr/>
							4,440
June	30	" Interest, . . .	0	12	2		10
							<hr/>
			£ 114	12	2		
						73,000)	44,400(608 =
							6000 12s. 2d.

*4th Method.* USING INTEREST TABLES.

Date.						Days.	Interest.
1889.							
May	3	To Goods due 17th					
		May, . . . . .	£ 50	4	6	44	6/0½
"	12	" Do. due 26th May,	63	15	6	35	6/1½
							<hr/>
June	30	" Interest, . . .	0	12	2		12/2
			£ 114	12	2		

In this example each item stands by itself, and has set against it the number of days between the due date and the date of closing the account. The 3rd and 4th methods are generally used among merchants, the advantage of these being that each item is independent of all the others, and if any error in calculation has been made in any item, it can be altered without disturbing the other parts of the work.

The same transactions, treated according to the 1st and 2nd methods, stand as follows:—

*1st Method.*

Date.	C. Dow, <i>Dr.</i>				Days.	Product.
1889. May 3	To Goods due 17th May, . . . . .	£ 50	4	6	9	450
" 12	" Do. due 26th May,	63	15	6		
	To £	114	0	0	35	3,990
June 30	" Interest, . . .	0	12	2		4,440 as before, =12/2
	£	114	12	2		7,300

In the foregoing examples the account is stated as it would be rendered by A. Bow, and as it appears in his ledger. The complete account in C. Dow's ledger would stand as follows:—

*2nd Method.* USING INTEREST TABLES.

Date.	A. Bow, <i>Cr.</i>				Days.	Interest per Table.
1889. May 3	By Goods due 17th May, . . . . .	£ 50	4	6	9	1/3
" 12	" Do. due 26th May,	63	15	6		
	By £	114	0	0	35	10/11
June 30	" Interest, . . .	0	12	2		12/2
	£	114	12	2		

*Note.*—It is customary in interest states, when finding the product of the sum by the number of days, to disregard the shillings and pence in the sum if under 10s., but to reckon them as £1 if 10s. or more; *e.g.*, £50, 4s. 6d. above is multiplied as £50, while £63, 15s. 6d. is reckoned £64.



## EXAMPLE III.

On 1st January 1889, D. Rae was due to an Indian bank Rs. 10,000; on the 10th January he drew a further sum of Rs. 1000; on the 15th, Rs. 1000; on the 25th, Rs. 3000. On the 17th March he called for his account. The interest rate was 10 per cent.

*5th Method.*

Date.		D. Rae, Dr.			Days, calculated back to 1st January.	Discount Numbers.
1889.			Rs.	a.		
Jan.	1	To Balance,	10,000	0	0	
"	10	" Cash, .	1,000	0	9	9,000
"	15	" " .	1,000	0	14	14,000
"	25	" " .	3,000	0	24	72,000
<hr/>						
Mar.	17	To	15,000	0	75	95,000
"	"	" Interest,	282	3		1,125,000
<hr/>						
			15,282	3		1,030,000
<hr/>						
						20

$$\begin{array}{r}
 73,000 \times 20,600,000 \times (282 \cdot 19 \\
 \quad \quad \quad 600 \quad \quad \quad = \text{Rs. } 282 \text{ } 3\text{a.} \\
 \quad \quad \quad 160 \\
 \quad \quad \quad 140 \\
 \quad \quad \quad 670
 \end{array}$$

This 5th method is in use in some banking houses, and its advantage consists in enabling the bank at a moment's notice to make up an account with interest. Every item, as it is entered, is discounted back to the beginning of the account. On the day of settlement the balance is multiplied by the number of days from the beginning of the account to the day of settlement, and from the product is taken the total of the discount numbers, and the result multiplied by double the rate and divided by 73,000 gives the interest.

An example of this method, with both Dr. and Cr. balances, is given on pages 52 and 53.

*1st Method.*

Date.		D. Rae, <i>Dr.</i>	Rs.	a.	Days.	Product.
1889.						
Jan.	1	To Balance, . .	10,000	0	9	90,000
"	10	" Cash, . .	1,000	0		
			11,000	0	5	55,000
"	15	" Do., . . To	1,000	0		
			12,000	0	10	120,000
"	25	" Do., . . To	3,000	0		
			15,000	0	51	765,000
Mar.	17	" Interest, . . To	282	3		
			15,282	3		
						1,030,000 = as before Rs. 282 3 a.

*3rd Method.*

Date.		D. Rae, <i>Dr.</i>	Rs.	a.	Days to Date of Settlement.	Product.
1889.						
Jan.	1	To Balance, . .	10,000	0	75	750,000
"	10	" Cash, . .	1,000	0	66	66,000
"	15	" Do., . .	1,000	0	61	61,000
"	25	" Do., . .	3,000	0	51	153,000
Mar.	17	" Interest, . .	282	3		
			15,282	3		
						1,030,000 = as before Rs. 282 3 a.

## EXAMPLE IV.

A successful commencement of the great work of codification of the mercantile law was made in 1882, when the Bills of Exchange Act was passed.

*Definition.*—A bill of exchange is an unconditional order in writing (draft), addressed by one person (the drawer) to another (the drawee), signed by the person giving it (the drawer), requiring the person to whom it is addressed to pay on demand, or at a fixed or determinable future time, a sum certain in

money to, or to the order of, a specified person (the payee) or to bearer.

When the drawee signifies his assent to the order of the drawer, which he does by signing his name across the draft, he is called the acceptor, and the document is thereafter called his acceptance. The acceptor is bound to pay the sum in the bill to the holder of it at the specified time (with three days of grace added when the bill is not payable on demand), technically called maturity. If he fail to meet his acceptance, the bill is said to be dishonoured, and the holder may recover as damages the amount of the bill, interest from its maturity, and the expenses of noting and of protest, where necessary. The legal rate of interest is 5 per cent., which will be allowed in the absence of other agreement.

C. Dow failed to meet his acceptance to A. Bain, due 27/30 March 1889 for £300. He liquidated the debt by instalments—on 15th April, £100; on 30th April, £100; on 15th May, £50; and the balance, with interest at 6 per cent., on 15th June.

Date.		C. Dow <i>Dr.</i> to A. Bain.				Days.	Product.
1889.							
Mar.	30	To Bill dishonoured, £	300	0	0	16	4,800
April	15	By Cash, . . . . .	100	0	0		
		To £	200	0	0	15	3,000
"	30	" Cash, . . . . .	100	0	0		
		To £	100	0	0	15	1,500
May	15	" Cash, . . . . .	50	0	0		
		To £	50	0	0	31	1,550
June	15	To Interest, . . . . .	1	15	8		
		To £	51	15	8		
"	"	By Cash, . . . . .	51	15	8		
							<div> <div>73,000)130,200(1·783 =</div> <div>572      £1 15 8</div> <div>610</div> <div>26</div> </div>

This account may be rendered by A. Bain to C. Dow in the following form:—It may be read C. Dow, *Dr.* and *Cr.*, he being debited with what he owes and credited with what he pays; or—

Dr.				Ct.			
Date.			Product.	Days.	Date.		Product.
1889. March 30	To Bill,	£	23,100	77	1889. April 15	By Cash, .	6,100
June 15	" Interest,	.	1 15 8		" 30	" Do., .	4,600
					May 15	" Do., .	1,550
					June 15	" Balance of Interest Nos.,	10,850
					" "	" Cash, .	...
		£	23,100				23,100

C. Dow in Account-Current with A. BAIN.										Cr.					
Dr.				Days.		Interest.		Date.				Days.		Interest.	
Date.															
1889. March 30	To Bill,	£ 300	0 0	77	£ 3 15 11½	1889. April 15	By Cash,	£ 100	0 0	61	£ 1 0 0½				
June 15	" Interest,	1 15 8				" 30	" Do., .	100	0 0	46	0 15 1½				
						May 15	" Do., .	50	0 0	31	0 5 1¼				
						June 15	" Balance of Interest, Dr.,				1 15 8				
						" "	" Cash,	51	15 8						



### EXAMPLE Va.

A. Begg acted as agent for C. Greig. On 1st January 1889 A. Begg had in hand £130, 15s. 9d. belonging to C. Greig; on 9th January he supplied C. Greig with goods, £13, 15s. net; on 18th January he recovered from T. Rae £35, 16s. 3d., a debt due to C. Greig; and on 15th February he retired C. Greig's acceptance, £111, 16s. 3d.; and on 20th February a similar acceptance for the same amount, £111, 16s. 3d. On 31st March he received from C. Greig in cash £25, 8s. 6d., and on 15th June £150.

Account as rendered by A. Begg on 30th June, allowing interest at 1 per cent. and charging interest at 5 per cent.

PERIODICAL INTEREST STATE OF A. BEGG'S INTROMISSIONS, as  
Agent for C. GREIG, from 1st January to 30th June 1889.

Date.		A. Begg, <i>Dr.</i> and <i>Cr.</i>					Days.	Interest Number.	
								<i>Dr.</i> 1 %	<i>Cr.</i> 5 %
1889.									
Jan.	1	To Balance	£ 130	15	9	8	1,048	...	
"	9	By Goods,	. 13	15	0				
		To £	117	0	9	9	1,053	...	
"	18	To T. Rae,	. 35	16	3				
		To £	152	17	0	28	4,284	...	
Feb.	15	By Bill, . .	111	16	3				
		To £	41	0	9	5	205	...	
"	20	" Bill, . .	111	16	3				
		By £	70	15	6	39	...	2,769	
Mar.	31	To Cash, . .	25	8	6				
		By £	45	7	0	76	...	3,420	
June	15	" Cash, . .	150	0	0				
		To £	104	13	0	15	1,575	...	
"	30	By Interest, .	0	12	6				
"	"	To Balance, £	104	0	6		8,165 2	6,189 10	
							16,330	61,890 16,330	
							73,000)	45,560(·624 = 176 12s. 6d. 30	

If the same rate of interest (5 per cent.) had been allowed and charged, A. Begg would have been debited with 5s. 5d., thus making the balance £104, 18s. 5d., thus:—

Dr. Interest numbers, 8,165

Cr. Interest numbers, 6,189

---

Dr., 1,976  
10

---

73,000)19,760(.270 = 5s. 5d.

516

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When the rate of interest on both sides of the account is the same, the ordinary mercantile (ledger account) form is available, but that form is unsuited to the case of different rates on the debit and credit sides.

The following account is made up, charging 5 per cent. on both sides, and it will be observed that although in the preceding and following cases the interest is calculated at the same rate (5 per cent.) on both *Drs.* and *Crs.*, yet they differ from one another and from the accurate interest, which is 5s. 4d., for the reason, that when the shillings in any balance or sum reaches 10 they are reckoned as £1, and when they amount to less than 10 they are discarded (*e.g.*, £130, 15s. 9d. is called £131, and £117, 0s. 9d., £117, in finding the product). The shillings discarded out of the balance on 31st March in the preceding example, are partly neutralised by the addition to the balance of 20th February; while in the succeeding example the whole of the debits happen to be accentuated by accretions, and thus it arises that the interest happens to be unduly reduced in that case. When the account is long, the excess on one side is usually nearly balanced by the deficiency on the other.





If a varying rate of interest is to be charged on both sides, the sums are multiplied by the number of days and by double the rate per cent., the products being set down in the interest number columns, and the difference of the totals only requires to be divided by 73,000.

The cash-credit rate is the rate charged by banks on cash credit accounts, which were introduced by the Royal Bank of Scotland in 1728 and by the Bank of Scotland in 1729, and have ever since been a prominent feature in Scotch Banking. The cash-credit is the name given to an arrangement between the bank and a customer, who desires the privilege of drawing, as and when required, advances from the bank to an extent agreed on, and for which security to the satisfaction of the bank is provided, interest being charged by the bank at cash-credit rates upon the actual balance due by the customer from day to day, he having right to pay-in money, and thus reduce the balance subject to interest whenever he is able. This enables the customer to utilise his money to the utmost, and in that way the cash-credit is equivalent to a fixed advance at a much lower rate of interest. The cash-credit rate is usually charged on secured overdrafts, but unsecured overdrafts, when permitted, are subject to a higher rate than cash-credits.

The cash-credit rate charged by Scotch banks was 6 per cent. to 10th January 1889, 5 per cent. to 23rd April, and  $4\frac{1}{2}$  per cent. after that date. The account-current form can be used, splitting up the days into the number at each rate, but the periodical interest form which follows is simpler.

Date.		A. Begg, <i>Dr.</i> and <i>Cr.</i>				Days.	Rate %.	Interest Number.	
								<i>Dr.</i>	<i>Cr.</i>
1889.									
Jan.	1	To Balance, £	130	15	9	8	6	12,576	...
"	9	By Goods, .	13	15	0				
		To £	117	0	9	{ 1 8	6 5	1,404 9,360	... ...
"	18	To T. Rae, .	35	16	3				
		To £	152	17	0	28	5	42,840	...
Feb.	15	By Bill, .	111	16	3				
		To £	41	0	9	5	5	2,050	...
"	20	" Do., .	111	16	3				
		By £	70	15	6	39	5	...	27,690
Mar.	31	To Cash, .	25	8	6				
		By £	45	7	0	{ 23 53	5 4½	... ...	10,350 21,465
June	15	" Do., .	150	0	0				
		To £	104	13	0	15	4½	14,175	...
"	30	" Interest,	0	6	3				
		To £	104	19	3				
								82,405	59,505
								59,505	
								73,000)22,900(·313 =	
								100 6s. 3d.	
								27	
								5	

## EXAMPLE VI.—VARYING RATES OF INTEREST.

At 31st December 1888 C. A. owed W. S. £500, and he borrowed £400 on 4th January and £100 on 15th January. On 15th May W. S. received £2000, price of property sold for C. A. On 10th June W. S. paid C. A. £500, and on 31st July settled the balance, after charging interest.

In this case the interest being at varying rates, the periodical balance method of calculation is usually followed.

Form of Cash Advance Account. Interest allowed 1 per cent. minimum monthly balances. Interest charged bank overdraft rates, 6½ per cent. to 10th January, 5½ per cent. thereafter.

<i>Dr.</i>		C. A. in a/c with W. S.				<i>Cr.</i>	
Date.				Days.	Rate.	Interest.	
						<i>Dr.</i>	<i>Cr.</i>
1888.							
Dec.	31	To Balance, . . . £	500	4	6½	26,000	...
1889.							
Jan.	4	" Advance, . . .	400				
			To £	900	6½	70,200	...
Jan.	15	" Advance, . . .	100	5	5½	49,500	...
			To £	1,000	5½	1,320,000	...
May	15	By Price of Property sold, .	2,000	120			
			By £	1,000			
June	10	To Cash, . . .	500				
			By £	500	2 mos.	1	...
July	31	" Interest, £19 4 10					61,000
		" Cash, 480 15 2					
			500				
						1,465,700	61,000
						61,000	
						73,000	1,404,700(19·24
						674	
						177	
						31	

Where the rates vary often and there happen to be many transactions, it is advantageous to divide the interest column where the varying rates occur into several columns for the different rates, as  $4\frac{1}{2}$ , 5,  $5\frac{1}{2}$ , 6,  $6\frac{1}{2}$ , placing in the respective columns the product of the amount by the days at the different rates. The total products at each rate must then be multiplied by twice the rate, and the results being added together produce the total to be divided by 73,000, where the interest falls on one side. Where there are both *Dr.* and *Cr.* products, the difference of the respective totals, after multiplication by the double rates, divided by 73,000, gives the interest.

### EXAMPLE VIA.

If in the above example the interest payable by W. S. were to be calculated on the daily balance at 1 per cent. up to May 30,  $1\frac{1}{2}$  per cent. up to June 6, and 2 per cent. to June 30, and  $1\frac{1}{2}$  per cent. thereafter, the following will illustrate the columnar method :—

Date.	W. S., Dr. and Cr.	Periodical Balances.	Days.	Dr. Products.	Cr. Products.
1888. Dec.	By Balance, . £	500 0 0	4	1 %	5½ %
1889. Jan.	" Advance, . .	400 0 0	{ 6 5	1½ %	2 %
"	By £ " Advance, . .	900 0 0 100 0 0	{ 120 15 7 4 20 31	7,000 15,500	4,000 10,000
May	To Price of Property, .	1,000 0 0 2,000 0 0		15,000	
June	To £ By Cash, . .	1,000 0 0 500 0 0			
July	To £ " Interest, £17 19 6 " Cash, 482 0 6	500 0 0 500 0 0		15,000 2 67,500 56,000 153,500	124,500 11 1,369,500 96,200 1,465,700 153,500
					7,400 13
					96,200
					73)1,312,200(17·975 =
					582 £17 19 6
					712
					550
					390

EXAMPLE VII.

WITH ITEMS AFTER CLOSING DATE.

John Bell, Leith, acted as factor for G. Diez, Rio, and was required to render and settle his Account on 30th June 1889, for the six months preceding. His transactions were as follows:—

On 31st December 1888, John Bell had in hand £35. He then sold a cargo, realising £1500, due 10th February. On 12th February he retired G. Diez's acceptance for £1600. Another cargo was sold by Bell on 1st May for £2100, due 15th July; and Bell accepted Diez's draft for £2000, due 1/4 August. The charges amount to £20. Interest 5 per cent.

1. CALCULATION OF INTEREST to date of last item, and DEDUCTION OF INTEREST ON BALANCE from last date to date of settlement.

Date.		John Bell, <i>Dr. &amp; Cr.</i>			Days.	Interest Number.	
						<i>Dr.</i>	<i>Cr.</i>
1888. Dec.	31	To Balance, £	35	0 0	41	1,435	
1889. Feb.	10	" Cargo, . .	1,500	0 0			
		To £	1,535	0 0	2	3,070	
"	12	By Bill, . .	1,600	0 0			
		By £	65	0 0	153		9,945
July	15	To Cargo, . .	2,100	0 0			
		To £	2,035	0 0	20	40,700	
Aug.	4	By Bill, . .	2,000	0 0			
		To £	35	0 0	35	1,225	1,225
June	30	" Charges, .	20	0 0			
		To £	15	0 0			
"	"	To Interest, .	4	13 3			34,035
		To £	19	13 3		45,205	45,205

2. CALCULATION OF INTEREST to date of settlement, and DEDUCTION OF DISCOUNT on later items back to that date.

Date.		John Bell, <i>Dr. &amp; Cr.</i>				Days.	Interest Number.	
							<i>Dr.</i>	<i>Cr.</i>
1888								
Dec.	31	To Balance, £	35	0	0	41	1,435	
1889								
Feb.	10	" Cargo, .	1,500	0	0			
		To £	1,535	0	0	2	3,070	
"	12	By Bill, .	1,600	0	0			
		By £	65	0	0	138		8,970
June	30	" Charges, .	20	0	0			
		By £	85	0	0			
July	15	To Cargo, £2,100				15	31,500	31,500
Aug.	4	By Bill, 2,000				35	70,000	70,000
			100	0	0			
		To £	15	0	0			
June	30	To Interest, .	4	13	3			34,035
		To £	19	13	3		74,505	74,505

In the above case there only occurs one red number on either side, and the simplest mode of treatment is to enter the red numbers again in black on the opposite side. The same result would have been obtained by entering in black in the *Dr.* side the balance of the red numbers 38,500. When there are many red numbers on each side, the practice is to sum the *Dr.* red numbers and the *Cr.* red numbers, and carry the difference in black to the side opposite to that on which there is an excess of red numbers.

*Dr.*

G. DIEZ in Account-Current

Date.		Due date.		Days	Product.	Interest.
1889.						
Feb. 12	To Bill, . . .	Feb. 12	£1,600 0 0	138	220,800	£30 4 10 $\frac{3}{4}$
May 1	" Acceptance, .	Aug. 4	2,000 0 0	85	70,000	9 11 9 $\frac{1}{4}$
June 30	" Charges, . .		20 0 0			
	Product from Cr.,				31,500	4 6 3 $\frac{1}{2}$
	Balance of Products,				34,035	4 13 3
	To Balance, . .		19 13 3			
			£3,639 13 3		286,335	£39 4 5 $\frac{1}{4}$

*Note.*—In this example the credit products exceed the debit products, and the difference is therefore credit interest. John Bell was owing money to G. Diez, and must allow interest on it, which must be entered to the credit of G. Diez in the current account. It is necessary to enter the balance of interest products, 34,035, in the products column, and the balance of credit interest, £4, 13s. 3d., in the interest column, both on the Dr. side, for the same reason that the credit balance of £19, 13s. 3d. must be entered on the Dr. side of the account-current, viz., in order to balance or equalise the debit and credit sides. The interest is transferred from the debit interest column to the credit of the current account in



with JOHN BELL.

Cr.

Date.		Due date.		Days			Product.	Interest.		
1888.	Dec. 31	By Balance, . .		£35	0	0	181	6,335	17	4 $\frac{1}{4}$
1889.	Feb. 10	" Cargo, . .	Feb. 10	1,500	0	0	140	210,000	£28	15 3
May	1	" do., . .	July 15	2,100	0	0	15	31,500	4	0 3 $\frac{1}{2}$
June	30	Product from Dr.,						70,000	9	11 9 $\frac{1}{4}$
		" Interest, . .		4	13	3				
				£3,639	13	3		286,335	£39	4 5 $\frac{1}{4}$
June	30	" Balance, . .		19	13	3				

the same way as the £19, 13s. 3d. is carried down to the credit of the next account. Discounts are entered in red, as being subtractive and not additive. By book-keeping usage, however, it is not customary to perform the subtraction, the same result being obtained by leaving the sum out of account on the one side and adding it to the other side of the account. The red products on the Dr. side are accordingly added together and carried to the Cr. side, and entered there in black, and so with the red products of the Cr. side, or the difference of the red products may be taken and the excess carried to the opposite side to that on which it occurs.

Interest calculated to a date (31st Dec.), beyond the closing date

*Dr.*

G. DIEZ in Account-Current

Date.			Due date.					Days to 31st Dec.	Products.
1889.			1889.						
Feb.	12	To Bill, . . .	Feb.	12	£1,600	0	0	322	515,200
May	1	" Acceptance, .	Aug.	4	2,000	0	0	149	298,000
June	30	Product from Cr.,							6,440
		Balance of Products,							34,035
	"	To Charges, . .			20	0	0		
	"	" Balance, . .			19	13	3		
					£3,639	13	3		853,675

Each item discounted back to the first date in the Account, the date of settlement.

*Dr.*

JOHN BELL in Account-

Date.			Due date.					Days from 31st Dec.	Products.
1888.									
Dec.	31	To Balance, . .			£35	0	0	0	
1889.			1889.						
Feb.	10	" Cargo, . . .	Feb.	10	1,500	0	0	41	61,500
May	1	" do., . . .	July	15	2,100	0	0	196	411,600
June	30	£15,	June	30				181	2,715
	"	Balance of Products,							34,035
	"	To Interest, . .			4	13	3		
					£3,639	13	3		507,135
June	30	" Balance, . .			£19	13	3		

*Note.*—In the last example the Cr. products represent discounts or interests to be added to the Dr. side, and that is the reason why the red product of the Dr. Balance, £15 for

(30th June), and the balance then discounted back to 30th June.

with JOHN BELL.

*Cr.*

Date.			Due date.					Days to 31st Dec.	Products.
1888. Dec.	31	By Balance, . . .	1889. Feb.	10	£35	0	0	365	12,775
1889. Feb.	10	" Cargo, . . .	Feb.	10	1,500	0	0	324	486,000
May	1	" do., . . .	July	15	2,100	0	0	169	354,900
		£35,	June	30				184	6,440
June	30	" Interest, . . .			4	13	3		
					£3,639	13	3		853,675
June	30	" Balance, . . .			£19	13	3		

and Interest calculated on final balance from the first date to

Current with G. DIEZ.

*Cr.*

Date.			Due date.					Days from 31st Dec.	Products.
1889.			1889.						
Feb.	12	By Bill, . . .	Feb.	12	£1,600	0	0	43	68,800
May	1	" Acceptance, . .	Aug.	4	2,000	0	0	216	432,000
June	30	" Charges, . . .	June	30	20	0	0	181	3,620
		Products from Dr.,							2,715
		" Balance, . . .			19	13	3		
					£3,639	13	3		507,135

181 days, is carried and entered in black among the Cr. products. This also explains why the difference in this case though an excess on the Cr. side, represents Dr. interest.

## EXAMPLE VIII.—ACCOUNT-CURRENT

*Dr.*

Low &amp; Co. in Account-

Date.			Due date.					Days.	Product.
1888.			1888.						
June	30	To Balance, . . . .	June 30	£113	1	3	184		20,792
July	3	" Sugar <i>p.</i> 'Juno,' . .	July 17	61	12	3	167		10,354
"	11	" 3 months' draft on Fry & Co., . . . .	Oct. 14	50	0	0	78		3,900
Aug.	1	" 1 month's draft on Sym & Co., . . . .	Sept. 4	20	0	0	118		2,360
Nov.	27	" Goods, . . . .	1889. Jan. 27	59	1	6	27		1,593
"	30	" Flour <i>p.</i> 'Ceres,' . .	" 30	83	15	4	30		2,520
Dec.	11	" 3 months' draft on Fry & Co., . . . .	Mar. 14	200	0	0	73		14,600
"	12	" Sugar <i>p.</i> 'Juno,' . .	1888. Dec. 26	120	1	8	5		600
"	14	" Goods <i>p.</i> 'Vulcan,' . .	" 28	230	9	1	3		690
"	31	Balance of Products, . .							9,348
									18,713
									48,044
				£938	1	1			
Dec.	31	To Balance, . . . .		£22	5	10			
		9,348							
		12							
		73)112,176(1·536 = £1, 10/8.							
		391							
		267							
		486							

rendered at 6 per cent. to 31st December 1888.

Current with Fox & Co.

*Cr.*

Date.		Due date.		Days.	Product.
1888.		1888.			
July 14	By our draft to T. Cox, .	Sept. 17	£100	0 0 105	10,500
Aug. 18	" Goods <i>p.</i> 'Star,' .	" 1	49	12 9 121	6,050
" 28	" remittance on Cox and Co., .	Aug. 28	150	0 0 125	18,750
Sept. 11	" our draft to T. Cox, .	Dec. 14	75	9 6 17	1,275
Oct. 30	" Goods <i>p.</i> 'Star,' .	1889. Jan. 30	86	4 9 30	2,580
Nov. 8	" Goods, . . . .	1888. Nov. 22	143	2 9 39	5,577
" 15	" our draft to Jones and Co., .	1889. Feb. 18	64	9 4 49	3,136
Dec. 1	" do., . . . .	Mar. 4	35	4 3 63	2,205
" "	" Goods, . . . .	1888. Dec. 14	100	1 3 17	1,700
" 28	" remittance, 60 days' sight, . . . .	1889. Mar. 1	110	0 0 60	6,600
	Balance, red products,				4,192
" 31	" Balance of Interest, .		1	10 8	14,521
" "	" Balance, . . . .		22	5 10	48,044
			£938	1 1	

*Example 8.*

On 30th June 1888 Low & Co. owed to Fox & Co. a balance of £113, 1s. 3d.

On 3rd July Fox & Co. sold them sugar, due in 14 days, £61, 12s. 3d.

On 11th July Fox & Co. remitted to them a draft on Fry and Co., due 14th October, for £50.

On 14th July Fox & Co. drew upon Low & Co., at 2 months, for £100, in favour of T. Cox.

On 1st August Fox & Co. remitted to Low & Co. draft for £20, on Sym & Co., due 4th September.

On 18th August Low & Co. sold to Fox & Co. goods, £49, 12s. 9d., due 1st September.

On 28th August Fox & Co. received from Low & Co. a demand draft on Cox & Co. for £150.

On 11th September Fox & Co. drew on Low & Co., at 3 months, for £75, 9s. 6d., in favour of T. Cox.

On 30th October Low & Co. sold to Fox & Co. goods, *ex* 'Star,' due 30th January 1889, £86, 4s. 9d.

On 8th November Low & Co. sold them goods, due 22nd November, £143, 2s. 9d.

On 15th November Fox & Co. drew on Low & Co., at 3 months, in favour of Jones & Co., for £64, 9s. 4d.

On 27th November Fox & Co. sold Low & Co. goods, due 27th January, £59, 1s. 6d.

On 30th November Fox & Co. sold Low & Co. flour, *ex* 'Ceres,' due 30th January, £83, 15s. 4d.

On 1st December Fox & Co. drew upon them for £35, 4s. 3d. at 3 months, due 4th March, and purchased from Low & Co. goods, due 14th December, for £100, 1s. 3d.

On 11th December Fox & Co. remitted to Low & Co. a 3 months' draft on Fry & Co., due 14th March, for £200.

On 12th December Fox & Co. sold Low & Co. sugar *p.* 'Juno,' due 26th December, £120, 1s. 8d.

On 14th December Fox & Co. sold Low & Co. goods, *ex* 'Vulcan,' due 28th December, £230, 9s. 1d.

On 28th December Fox & Co. received from Low & Co. a 60 days' sight draft for £110, due 1st March.

Prepare Account-Current and Interest State, showing balance with interest at 31st December 1888. Interest—6 per cent.

## EXAMPLE IX.

## ACCUMULATION OF INTEREST.

On 1st January 1888, curator was in advance for his ward £50; on 1st July he advanced £20; on 1st April 1889, £30; and on 1st July 1889, £20. Close the account on 1st August 1889, with 5 per cent. interest accumulated annually.

Date.		The Curator, <i>Dr. &amp; Cr.</i>				Days.	Product.
1888.							
Jan.	1	By Balance, .£	50	0	0	182	9100
July	1	" Cash, . .	20	0	0		
		By £	70	0	0	184	12880
							<hr/> 732)2198·0(3·002 2 0
1889.							
Jan.	1	" Interest, .	3	0	0		
		By £	73	0	0	90	6570
April	1	" Cash, . .	30	0	0		
		By £	103	0	0	91	9373
July	1	" Cash, . .	20	0	0		
		By £	123	0	0	31	3813
Aug.	1	" Interest, .	2	14	1		
		By £	125	14	1		<hr/> 73)197·56(2·706 515 460

By the 37th section of the Pupils Protection Act, banks must accumulate interest and principal once a year on judicial deposits.

*Note.*—The Creditor gains by frequent accumulation of interest. On the other hand, a bill discounter makes more interest on long-dated than on short-dated bills, for he gets interest in

hand earlier and holds it for a longer time. The discount, for instance, on a bill of £1000 for 2 years at 5 per cent. would be £100, and for 73 days only £10. The bill discounter gains by having the difference, £90, in hand to trade with. Higher rates are charged on long-dated bills, because the risk is greater the longer the credit.

## EXAMPLE X.

CURATORIAL ACCOUNT CURRENT BALANCED *de die in diem*,  
WITHOUT INTEREST.

Date.	The Curator, <i>Dr.</i> and <i>Cr.</i>	Periodical Balance.	Bank Account.
1889.			
Jan. 1	To Balance,	Dr. £10 0 0	Cr. £15
" 12	By Debt paid,	160 0 0	
		<hr/>	
		Cr. £150 0 0	
" 14	To Interest received, £130		
	By Paid into Bank, 130		130
		<hr/>	<hr/>
" 19	By Account paid, £40		Cr. £145
	To Drawn from Bank, 40		40
		<hr/>	<hr/>
			Cr. £105
" 23	By Law Agent's a/c paid,	7 5 0	
		<hr/>	
		Cr. £157 5 0	

## CURATORIAL INTEREST STATES.

In preparing *de die in diem* interest states for a curatory, factory, or trust, it is necessary to show, when the curator is in advance to the estate and claims interest on his advance, that there was no money in the estate bank account out of which he could have repaid the advance or part of it to himself. To the extent that his advances could have been so repaid he is not entitled to interest beyond that allowed by bank.

In calculating interest due to the curator on the foregoing account, the sum in bank must be deducted from the Cr. balance before calculating interest on it at 5 per cent. (*see* Account, page 59). The curator is not entitled to advance money at 5 per cent. when there were curatory funds available in bank.



[illegible]

INTEREST TABLES.

To form a 5 per cent. Interest Table for one day. Since £7, 12s. 1d. yields one farthing at 5 per cent. in one day, by continued addition the following table is formed, and from it graduated tables in the usual form can be readily prepared:—

Principal.			Day's Interest, 5 per cent.	Principal.			Day's Interest, 5 per cent.
£	s.	d.		£	s.	d.	
7	12	1	$\frac{1}{4}$	98	17	1	$3\frac{1}{4}$
15	4	2	$\frac{1}{2}$	106	9	2	$3\frac{1}{2}$
22	16	3	$\frac{3}{4}$	114	1	3	$3\frac{3}{4}$
30	8	4	1	121	13	4	4
38	0	5	$1\frac{1}{4}$	129	5	5	$4\frac{1}{4}$
45	12	6	$1\frac{1}{2}$	136	17	6	$4\frac{1}{2}$
53	4	7	$1\frac{3}{4}$	144	9	7	$4\frac{3}{4}$
60	16	8	2	152	1	8	5
68	8	9	$2\frac{1}{4}$	159	13	9	$5\frac{1}{4}$
76	0	10	$2\frac{1}{2}$	167	5	10	$5\frac{1}{2}$
83	12	11	$2\frac{3}{4}$	174	17	11	$5\frac{3}{4}$
91	5	0	3	182	10	0	6

The table on page 62 is slightly modified from a table prepared by Edward T. Jones for his *Treatise on Book-keeping*. It will be found useful for checking interest calculations in the absence of more extended interest tables. If the rate be 5 per cent., and the total of the addition of the products of the various sums in an interest account by the number of days be 600,062, the interest corresponding to this is at once obtained by reference to the table.

Opposite 600,006·77 in the column headed principal is £82 3 10 $\frac{1}{4}$   
Interest thereon for one day—

„	53·229	„	„	1 $\frac{3}{4}$
„	600,059·999	„	„	£82 4 0

and the odd 2 gives less than  $\frac{1}{4}$  interest.

If it be required to convert any product at another rate than 5 per cent., multiply by double the rate and strike off the right-

hand figure, and use the result to obtain interest by the table. Thus, total products, 33,010, interest 4 per cent.— $33,010 \times 8 = 264,080 = 26,408$  at 5 per cent., and by the table—

20,006·562	£2 14 9 $\frac{3}{4}$
6,007·291	0 16 5 $\frac{1}{2}$
304·166	0 0 10
91·25	0 0 3
<hr/>	<hr/>
26,409·269	£3 12 4 $\frac{1}{4}$
<hr/>	<hr/>

Alternatively, to convert interest at 5 per cent. to any other rate, multiply the interest at 5 per cent. by double the said rate and divide by ten.

Thus 33010 at 5 per cent. From the table we find—

30006·041	£4 2 2 $\frac{1}{2}$
3003·645	0 8 2 $\frac{3}{4}$
<hr/>	<hr/>
33009·686	£4 10 5 $\frac{1}{4}$
<hr/>	<hr/>
Interest at 5 per cent.,	£4·521 8
	<hr/>
	£36·168 ÷ 10
	<hr/>
	£3·6168
	<hr/>
Interest at 4 per cent.,	£3 12 4 $\frac{1}{4}$

To find interest corresponding to the same product at 13 per cent.

Interest at 5 per cent.,	4·521 × $\frac{26}{10}$
	6·2
	<hr/>
	9·042
	2·713
	<hr/>
	11·755
	<hr/>
Interest at 13 per cent.,	£11 15 1 $\frac{1}{4}$

INTEREST TABLE for 1 Day at 5 per cent. per annum, arranged  
for the Conversion of Products into Interest.

Principal.	Interest.			Principal.	Interest.		
	£	s.	d.		£	s.	d.
7'604			$\frac{1}{4}$	100,002'395	13	13	$11\frac{3}{4}$
15'208			$\frac{1}{2}$	200,004'791	27	7	$11\frac{1}{2}$
22'812			$\frac{3}{4}$	300,007'187	41	1	$11\frac{1}{4}$
30'416		1		400,001'979	54	15	$10\frac{3}{4}$
45'625		$1\frac{1}{2}$		500,004'375	68	9	$10\frac{1}{2}$
53'229		$1\frac{3}{4}$		600,006'770	82	3	$10\frac{1}{4}$
60'833		2		700,001'562	95	17	$9\frac{3}{4}$
76'041		$2\frac{1}{2}$		800,003'958	109	11	$9\frac{1}{2}$
83'645		$2\frac{3}{4}$		900,006'354	123	5	$9\frac{1}{4}$
91'25		3		1,000,001'145	136	19	$8\frac{3}{4}$
106'458		$3\frac{1}{2}$		2,000,002'291	273	19	$5\frac{1}{2}$
205'312		$6\frac{3}{4}$		3,000,003'437	410	19	$2\frac{1}{4}$
304'166		10		4,000,004'583	547	18	11
403'020	1	$1\frac{1}{4}$		5,000,005'729	684	18	$7\frac{3}{4}$
501'875	1	$4\frac{1}{2}$		6,000,006'875	821	18	$4\frac{1}{2}$
600'729	1	$7\frac{3}{4}$		7,000,000'416	958	18	1
707'187	1	$11\frac{1}{4}$		8,000,001'562	1,095	17	$9\frac{3}{4}$
806'041	2	$2\frac{1}{2}$		9,000,002'708	1,232	17	$6\frac{1}{2}$
904'895	2	$5\frac{3}{4}$		10,000,003'854	1,369	17	$3\frac{1}{4}$
1,003'75	2	9		20,000,000'104	2,739	14	$6\frac{1}{4}$
2,007'5	5	6		30,000,003'958	4,109	11	$9\frac{1}{2}$
3,003'645	8	$2\frac{3}{4}$		40,000,000'208	5,479	9	$0\frac{1}{2}$
4,007'395	10	$11\frac{3}{4}$		50,000,004'062	6,849	6	$3\frac{3}{4}$
5,003'541	13	$8\frac{1}{2}$		60,000,000'312	8,219	3	$6\frac{3}{4}$
6,007'291	16	$5\frac{1}{2}$		70,000,004'166	9,589	0	10
7,003'437	19	$2\frac{1}{4}$		80,000,000'416	10,958	18	1
8,007'187	1	1	$11\frac{1}{4}$	90,000,004'270	12,328	15	$4\frac{1}{4}$
9,003'333	1	4	8	100,000,000'520	13,698	12	$7\frac{1}{4}$
10,007'083	1	7	5	200,000,001'041	27,397	5	$2\frac{1}{2}$
20,006'562	2	14	$9\frac{3}{4}$	300,000,001'562	41,095	17	$9\frac{3}{4}$
30,006'041	4	2	$2\frac{1}{2}$	400,000,002'083	54,794	10	5
40,005'520	5	9	$7\frac{1}{4}$	500,000,002'604	68,493	3	$0\frac{1}{4}$
50,005'	6	17	0	600,000,003'125	82,191	15	$7\frac{1}{2}$
60,004'479	8	4	$4\frac{3}{4}$	700,000,003'645	95,890	8	$2\frac{3}{4}$
70,003'958	9	11	$9\frac{1}{2}$	800,000,004'166	109,589	0	10
80,003'437	10	19	$2\frac{1}{4}$	900,000,004'687	123,287	13	$5\frac{1}{4}$
90,002'916	12	6	7	1,000,000,005'208	136,986	6	$0\frac{1}{2}$

## LOGARITHMS FOR THE COUNTING-HOUSE.

Had we a decimal system of money, weights, and measures, logarithms would be used by every one who valued time. With our present system their use is restricted to those familiar with decimals, who find them advantageous in saving labour. There are reproduced on pages 102–105 the well-known tables of four-place logarithms and antilogarithms, which are so easily used that an intelligent boy can make himself master of this most powerful aid to calculation by a few hours' practice. One may be able efficiently to use logarithms who knows nothing of the method by which they are calculated.

The logarithms in these tables are common logarithms, the base being 10. The common logarithm of any number is the index of that power to which, if 10 be raised, the said number is the result. Thus:—

Number.	Base. <sup>Index of Power.</sup>	Logarithm.
·01	$10^{-2}$	$\bar{2}$ .
·1	$10^{-1}$	$\bar{1}$ .
1	$10^0$	0.
10	$10^1$	1.
100	$10^2$	2.
1,000	$10^3$	3.
10,000	$10^4$	4.

The logarithm of any number from 1 upwards, but under 10, is a decimal fraction; from 10 to under 100, 1 followed by a decimal; from 100 to under 1000, 2 followed by a decimal. The integral part of the logarithm (0, 1, and 2 in these cases) is called the characteristic and is found by rule. The decimal part is found by referring to the Table of Logarithms. Thus, to

find the logarithm of 6·345; in the column under natural number, opposite 63, in the fifth column (under 4) is found ·8021 as the logarithm of 6·34, then under 5 in proportional parts on the same line is found 3, which added to the terminating figures of ·8021 gives ·8024 as the logarithm to 4 places of 6·345. In seeking out the logarithm of any number you disregard, in the first instance, the decimal point in the number, and only use it to determine the characteristic of the logarithm which goes before the decimal point. The characteristic may be positive or negative. The decimal portion of the logarithm is always positive, and is the same for all numbers having the same digits. For example the number

6345	has for its logarithm	3·8024
634·5	"	2·8024
63·45	"	1·8024
6·345	"	·8024
·6345	"	$\bar{1}$ ·8024
·06345	"	$\bar{2}$ ·8024
·006345	"	$\bar{3}$ ·8024

*Rule for finding Characteristic.*—The positive characteristic is always 1 less than the number of digits in the integral part of the number. The negative characteristic is the same as the place of the first significant figure after the decimal point where the number is a fraction. The negative characteristics are written with the minus sign above the number. The negative characteristic is always used in a manner opposite to the decimal part. If the decimal part be added, the negative characteristic is subtracted, and if the decimal part be subtracted, the negative characteristic is added.

The table of antilogarithms is used in a similar way to ascertain the natural number corresponding to a given logarithm. For example, the number corresponding to the logarithm ·6730 is found by referring to the table of antilogarithms under ·67, and in the fourth column (under 3) is found 4·710,

the number corresponding to log.  $\cdot 673$ . The decimal point is inserted after the 4 because the log. has 0 for characteristic, indicating that the number lies between 1 and 10.

The practical value of the Tables will appear by a few illustrations.

*Multiplication.*—The sum of the logarithms of the factors gives the logarithm of the product.

To multiply  $6\cdot345$  by  $\cdot7424$  add their logs.

$$\begin{array}{rcl} \text{Log. } 6\cdot345 & = & \cdot8024 \\ \text{Log. } \cdot7424 & = & \bar{1}\cdot8706 \\ \hline \text{Log. of product } 4\cdot710 & = & \cdot6730. \end{array}$$

The decimal part of the logarithm is positive, and the 1 which is carried from the addition of  $8 + 8$  cancels the negative characteristic.

*Division.*—The logarithm of a quotient, ratio, or fraction is the excess of the logarithm of the dividend, antecedent, or numerator, over the logarithm of the divisor, consequent, or denominator.

To divide  $7\cdot691$  by  $39\cdot16$ . Subtract the log. of divisor from log. of dividend and the antilogarithm of remainder is the quotient.

$$\begin{array}{rcl} \text{Log. } 7\cdot691 & = & \cdot8860 \\ \text{Log. } 39\cdot16 & = & \bar{1}\cdot5929 \\ \hline \text{Log. of quotient } & \cdot1963 = & \bar{1}\cdot2931 \end{array}$$

*Involution.*—The logarithm of the square, cube, fourth, or  $n$ th power of any number is 2, 3, 4, or  $n$  times the logarithm of that number.

To raise  $\cdot04961$  to the fourth power, multiply log.  $\cdot04961$  by 4, and take antilogarithm of result.

$$\begin{array}{lcl} (\cdot04961)^4 & \bar{2}\cdot6956 \times 4 = \bar{6}\cdot7824 & \text{the log. of } \cdot000006059 \\ (\cdot8433)^4 & \bar{1}\cdot9260 \times 4 = \bar{1}\cdot7040 & \text{" } \cdot5058 \\ (\cdot85)^5 & \bar{1}\cdot9294 \times 5 = \bar{1}\cdot6470 & \text{" } \cdot4436 \end{array}$$

In the last case the true result is  $\cdot4437$ . To obtain very exact results more extended tables of logarithms must be employed. One great use of the table of four place logs. is to check results obtained by extended calculation.

*Evolution.*—The logarithm of the square, cube, fourth,  $n$ th root is the half, third, fourth,  $n$ th part of the logarithm of the number.

To find the square root of 9216. Divide the log. of the number by 2, and take the antilog. of quotient.

$$\begin{array}{rcl} \sqrt[2]{9216} & 3.9646 \div 2 = 1.9823 & \text{the log. of } 96.01 \\ \sqrt[3]{05432} & 2.735 \div 3 = 1.5783 & \text{" } .3787 \\ \sqrt[3]{3539} & 1.5489 \div 3 = 1.8496 & \text{" } .7073 \end{array}$$

In dividing the log. by the power  $1.5489$  must be regarded as  $.5489 - 1$  or as  $2.5489 - 3$ , which divided by 3 gives  $.8496 - 1$  or  $1.8496$ .

*Simple Interest.*—Required interest on £382, 18s., for 230 days at  $3\frac{3}{4}$  per cent.

$\frac{382.9 \times 230 \times 3.75}{36500}$	Log. 382.9	2.5831
	Log. 230	2.3617
	Log. 3.75	.5740
		<hr/> 5.5188
	Log. 36500	4.5623
		<hr/> 9.565
		log. of 9.046
		£9   0   11

*Compound Interest.*—

Let  $p$  = principal.

"  $n$  = number of years.

"  $i$  = interest of £1 for one year.

"  $s$  = amount of principal and interest.

Then  $1+i$  = amount of £1 principal with interest at end of first year, and the amount of any other sum will be in the same proportion.

As 1 is to  $1+i$  so is any sum to its amount in one year; and since  $1+i$  at the end of the year forms a new principal, its amount in 1 year gives the amount of £1, the original principal at the end of the second year.

$$\begin{array}{lcl} 1 : 1+i :: 1+i & : & (1+i)^2 \text{ amount of } \text{£}1 \text{ at end of second year.} \\ 1 : 1+i :: (1+i)^2 & : & (1+i)^3 \quad \text{"} \quad \text{"} \quad \text{third} \quad \text{"} \\ 1 : 1+i :: (1+i)^3 & : & (1+i)^4 \quad \text{"} \quad \text{"} \quad \text{fourth} \quad \text{"} \end{array}$$



and so on. Therefore, at the end of the  $n$ th year the amount of £1 and interest compounded would be  $(1+i)^n$ .

This multiplied by any principal sum gives  $p(1+i)^n$  = the amount of  $p$  in  $n$  years.

$$\text{Log. } s = \text{log. } p + n \text{ log. } (1+i).$$

*Rule.*—Raise the amount of £1 at the first year's end, viz.,  $1+i$  to the same power as the number of years, and multiply the result by the principal.

Required the amount of £100 in four years at 5 per cent.,  $100 \times (1.05)^4$ .

$$\text{Log. } (1+i) = \text{log. } 1.05 = .0212$$

$$n = 4$$

$$n \text{ log. } (1+i) \quad .0848$$

$$\text{Log. } 100 = 2.$$

$\text{Log. } 100 + 4 \text{ log. } (1.05) = 2.0848$ , which is the log. of 121.5, or £121, 10s.,—the correct result being £121, 11s

Required the amount of £3750, accumulated at 5 per cent. per annum, for 14 years.

$$£3750 \times (1.05)^{14} = £7424, 15s.$$

$$14. \text{ Log. } 1.05 = .0212 \times 14 = .2968$$

$$\text{Log. } 3750 = 3.5740$$

$$\underline{\hspace{1cm}} 3.8708 \text{ the log. of } 7427$$

which gives £7427, or about £2, 5s. more than the correct amount, arising from the table giving log. 1.05 as .0212 instead of .0211893.

*Present Values.*—

$$\text{As } 1+i : 1 :: 1 : \frac{1}{1+i} = p.v. \text{ of } £1 \text{ due 1 year hence}$$

$$" \quad 1+i : 1 :: \frac{1}{1+i} : \frac{1}{(1+i)^2} = " \quad " \quad 2 \text{ years } "$$

$$" \quad 1+i : 1 :: \frac{1}{(1+i)^2} : \frac{1}{(1+i)^3} = " \quad " \quad 3 \text{ years } "$$

$$" \quad 1+i : 1 :: \frac{1}{(1+i)^{n-1}} : \frac{1}{(1+i)^n} = " \quad " \quad n \text{ years } "$$

Required the present value of £500, due 10 years hence, at 4 per cent. per annum, accumulated yearly.

$$\frac{500}{(1.04)^{10}} = £337, 15s. 7d.$$

10 Log. 1.04 = .0170  $\times$  10 = .170. Log. 500 = 2.6990.

2.6990 - .170 = 2.5290 the log. of 338.1 or £338, 2s., or 6s. 5d. in excess of the true result.

*Note.*—Where it is desired to accumulate interest at other periods than once a year, instead of  $(1+i)^n$  in either the compound interest or present value formulæ, substitute  $\left(1 + \frac{i}{m}\right)^{mn}$  *e.g.*, for half yearly accumulations  $m = 2 \therefore (1 + \frac{1}{2}i)^{2n}$   
 quarterly "  $m = 4 \therefore (1 + \frac{1}{4}i)^{4n}$

### THE APPORTIONMENT ACT, 1870.

It is enacted that after 1st August 1870—‘All rents, annuities, dividends, and other periodical payments in the nature of income shall, like interest on money lent, be considered as accruing from day to day, and shall be apportionable in respect of time accordingly.

‘The word “Dividends” includes (besides dividends strictly so called) all payments made by the name of dividend, bonus, or otherwise out of the revenue of trading or other public companies, divisible between all or any of the members of such respective companies, whether such payments shall be usually made or declared at any fixed times or otherwise; and all such divisible revenue shall, for the purposes of this act, be deemed to have accrued by equal daily increment during and within the period for or in respect of which the payment of the same revenue shall be declared or expressed to be made, but the said word “dividend” does not include payments in the nature of a return or reimbursement of capital.’

These clauses, along with the Apportionment Act of 1834, are very frequently under the consideration of accountants. The application of the statutes sometimes entails temporary hardship and inconvenience upon certain persons, such as

liferenters and others. For example, a testator directs his trustees to retain in trust certain investments made by him, and to pay over the income to a certain beneficiary. The investments may be bank or insurance shares, payment of the dividends on which is long postponed. In such cases the beneficiary may be debarred from the receipt of income for a year or more after testator's decease. This loss is made good when the liferent ceases or when the stocks are sold. The dividends are held to have accrued by equal daily increment during the period of the account out of which the profits have arisen, irrespective of the dates of payment of the dividends.

*Example.*

A testator died on 3rd July 1887, leaving £2900 National Bank of Scotland stock. The Bank's year ends on 1st November, and dividends are payable in January and July following.

The dividend at 15 per cent. per annum, due 12th July 1887, was payable out of profits for year ending 1st November 1886, and therefore effeirs to capital, . . . . . £217 10 0

The dividend of 15 per cent. per annum, due 10th January 1888, was paid out of profits for year ending 1st November 1887, and being for the first half of that year, viz. to 1st May, it falls entirely to capital, . . . . . £217 10 0

The dividend due 12th July 1888 is the balance of dividend at 15 per cent. per annum to 1st November 1887, and is therefore apportionable—

To Income, 121 days from 3rd July to 1st November, . . . . .	£144 4 0
To Capital, balance of dividend, . . . . .	73 6 0
	<u>73 6 0</u>

Thus giving to Capital proportion for 244 days from 1st November 1886 to 3rd July 1887, . . . . .	£290 16 0
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Two points may be noted in this apportionment, which has been carried out in the customary manner:—

1. The liferenter might fairly have claimed that the dividend

due 10th January 1888 should have been apportioned as an instalment on account of dividend from 1st November 1886 to 1st November 1887, and in which the liferenter was therefore interested to the extent of  $\frac{1}{3}\frac{2}{6}\frac{1}{5}$ th parts. If that had been done he would have received £72, 2s. out of the January 1888 dividend, and a similar sum out of the July 1888 dividend. A liferenter in such circumstances would probably be entitled to insist on this mode of apportionment if the company failed before the second half of the dividend became due. It is usual, however, to defer payment of the apportioned part until 'the entire portion of which such apportioned part shall form part shall become due and payable,' in accordance with the Apportionment Act, 1870, sec. 3.

2. A fair apportionment would not have been effected by giving to capital out of the July dividend either 63 days' interest at 15 per cent. on £2900, or  $\frac{63}{184}$  parts of the half-year's dividend.

#### APPORTIONMENT OF PRICE OF LIFERENTED STOCKS SOLD.

In the case *Donaldson v. Donaldson's Trs.*, 12th Dec. 1851, 14 D. 165 ; 24 Jurist 173 ; 1 Stuart 147.

'A party by his trust-settlement constituted his widow 'liferentrix of his property, part of which consisted of shares 'in two joint-stock shipping companies. The trustees sold the 'shares in both stocks, receiving £10 per share of the stock of 'the one company "in lieu of dividend" over and above £140 'of price for the shares, and in the other a slump sum: held 'that, although, in the first case, no dividend was paid by the 'company at the end of the year, the widow was entitled to 'payment, out of the price, of such a proportion of the £10 per 'share as effeired to the proportion of the year during which 'the trustees held the stock ; and in the second case (in which 'a dividend had been paid), of a sum equal to the like propor- 'tion of the dividend paid.' Further, 'That in ascertaining

‘ the proportion thus payable to the widow, the Court would not enter into any enquiry whether, at the date of the sale, any profits had been realised out of which a dividend could be paid, but would assume that there had been then realised a proportion of the dividend corresponding to the portion of the year which had then elapsed.’

Following this case, where liferented stocks are sold a portion of the price must be transferred to revenue to compensate the liferenter for the interest which he would otherwise lose by the sale of the stock.

In the case *Cameron’s Factor v. Cameron*, 15 Oct. 1873, 1 Rettie 21. ‘ In a question between a liferenter and fiar, held that the price of shares sold in the interval between two dividends fell to be divided between capital and revenue, on the basis of the dividend admitted by the parties to have been expected at the date of sale, and not of the dividend ultimately paid.’

In determining the amount to be treated as revenue interesting questions may arise. For example, a testator died on 1st October 1887 leaving the liferent of his estate, consisting *inter alia* of 100 shares of the Liverpool and London and Globe Insurance Company, sold for settlement 30th May 1888 *cum div.* The liferenter will therefore fall to be credited, out of the price, with proportion of dividend on 100 shares at the rate expected at the time of sale from 1st October 1887 (the date of the death) to 30th May 1888 (the date of sale), in respect of loss of income thereby caused to him. The Insurance Company had in May 1888 declared a dividend for year 1887 at £1, 6s. per share, paid by an interim payment of 8s. per share on 22nd November 1887, and 18s. per share balance on 22nd May 1888. In May 1889 a dividend at 28s. per share for the year 1888 was declared, and it might be argued that the calculation of the income falling to the liferenter ought to be made on the 100 shares at the rate of £1, 6s. per share up to 31st December 1887; and at the rate of £1, 8s. per share from that date to 30th May 1888 (date of sale),

instead of at £1, 6s. per share for the whole period. It seems a sufficient answer that at the time of the purchase the buyer of the shares transacted on the basis of the former dividend, viz., 26s. per share, and that was accordingly the rate of dividend expected at the date of sale.

Similarly, if trust funds which are liferented be invested in stocks or shares between dividends, a part of the price paid is for the accrued dividend to date of purchase. When the first dividend is received by the trustees, they are not entitled to treat the whole of it as revenue, but must carry to capital a proportion corresponding to the period of earning which had run prior to the date of purchase.

#### APPORTIONMENT OF HALF-YEARLY OR QUARTERLY COUPONS.

The question whether any particular half-yearly or quarterly sum to be apportioned is to be treated as accruing from day to day over the period covered by the half-year or quarter, or as a portion of the larger sum due for the whole year, very frequently arises, and although it is difficult to gather a definite rule, either from the decisions in Court or from general practice, the principles determining the proper treatment of each case are easily explained. As an example, take the case of a debenture, dated 15th May, and with interest payable at Martinmas and Whitsunday. The liferenter of it dies on 13th August after its date. The half-year consists of 180 days, and the period 15th May to 13th August (90 days) is half of it. Are the liferenter's representatives entitled to half of the interest for the half-year, or to  $\frac{90}{180}$  of a whole year's interest, which is a less sum? There can be no doubt that they are entitled in equity only to the less sum, being the proportion of the year's interest equal to 90 days, for it is seen that if the liferenter's representatives get  $\frac{1}{4}$  of a year's interest they draw  $1\frac{1}{4}$  days interest too much, and the fiar would only obtain  $\frac{1}{4}$  of a year's interest for the remaining

half of the period to Martinmas, and  $\frac{1}{2}$  of a year's interest for the 185 days from Martinmas to Whitsunday, or  $\frac{3}{4}$  of a year's interest for 275 days, that is,  $1\frac{1}{4}$  days interest too little.

If the investment be £1,000 at 5 per cent., then the liferenter's representatives ought to receive 90 days interest at 5 per cent., £12, 6s. 7d., not £12, 10s. as would be given by the method of settlement by counting 90 days, as the half of the Whitsunday to Martinmas half-year.

The fact is that £25, 6s. 10d., and not £25, is the interest from 11th November to 15th May, and that sum, with £12, 6s. 7d. for each of the two quarters from 15th May to 13th August and to 11th November, gives the £50 for the year. But how stands the case if the debenture expire at Martinmas, having been current for a few years from a previous Martinmas? Then the liferenter had received only £25 for the half-year from Martinmas to Whitsunday (185 days) instead of £25, 6s. 10d., and it would be unfair to settle with the representatives by giving them either £12, 6s. 7d., the 90 days interest from Whitsunday to 13th August, or £12, 10s., being half of the current half-year's interest, in respect that 90 days is the exact half of the Whitsunday to Martinmas half-year. What the liferenter is entitled to is the balance of 6s. 10d. unpaid of the 185 days interest and £12, 6s. 7d. interest for 90 days, making, with the £25, £37, 13s. 5d., being the interest for 275 days from Martinmas up to 13th August, and leaving £12, 6s. 7d. over of the year's interest to pay to the fiar, being exactly the 90 days interest from 13th August to Martinmas. This method ought to be followed in all cases of interest payable periodically at a certain rate per cent. per annum, but where the income is of the nature of profits earned over a particular period, then the period must stand by itself to be apportioned as if the earning had taken place by equal daily increment over that period.

Another practical illustration of the principle contended for may be useful:—

On 13th August 1889 a sum of £1000 was lent to company A at 5 per cent. for the period to Whitsunday 1899, and a similar sum to company B for the period to Martinmas 1899. Both companies were to issue debentures with interest-coupons payable at Martinmas and Whitsunday. Company A ought to make the first coupon for £12, 13s. 5d. (a half-year's interest less 90 days, that is for  $92\frac{1}{2}$  days), the other 19 coupons being each for £25. In this way the company pays  $92\frac{1}{2} + 182\frac{1}{2} = 275$  days interest for the period from 13th Aug. 1889 to Whitsunday 1890, which is correct. Company B ought to make the first coupon for £12, 6s. 7d., and the 20 coupons for the ten complete years for £25 each.

#### APPORTIONMENT OF RENTS.

The Apportionment Acts modify the old Scotch legal rules for division of rents between heir and executor or liferenter and fiar. The general principle now applicable is, that rents are held as accruing from day to day over the period of the occupation in respect of which they are payable. The only difficulty is to determine the period of occupation for which the rent is paid. Rents payable for a term, antecedent to the proprietor's or ancestor's death, fall into his executry estate, and further, the executors are entitled to a proportion of the rents of the current term, from its commencement to the date of death. The executor, in short, takes what the proprietor would have received had he drawn the rents daily for the occupation down to the day of his death. By the old rule of law, the rent of pastoral or grazing farms was payable half-yearly in advance—the entry being usually Whitsunday, and the first half-year's rent being payable at Whitsunday, the term of entry, and the second at Martinmas for the first year's possession. And, notwithstanding the Apportionment Acts, where rents have been contracted for in advance, a liferenter has no claim upon the executors for repayment out



of the advance rent of the proportion for the period subsequent to the date of death. Where, however, as is customary in leases, the terms of payment of the rent of grass farms with Whitsunday entry are Martinmas and Whitsunday after entry, such rents ought, notwithstanding the old rule of law, to be deemed accruing from day to day from the term of entry, and be apportionable accordingly. Prof. Rankine (*Leases*, pp. 311 and 312), following the case of *Campbell v. Campbell*, 18th July 1849, 11 D. 1426, takes a contrary view, but that case was decided under the 1834 Act, which is less wide than that of 1870.

*Case I.*—Proprietor A. died 1st February, possessed of pastoral farm.

Tenant's entry Whitsunday, rents payable half-yearly. First payment at Martinmas after entry.

A.'s executors would be entitled only to a proportion payable at Whitsunday after his death, corresponding to the period from the preceding Martinmas to 1st February, the date of death.

*Case II.*—Proprietor B. died 1st February, possessed of pastoral farms.

Tenant's entry Whitsunday, rents payable half-yearly. First payment at Whitsunday, the term of entry.

B. having during his life at Martinmas received (or become entitled by law or by the lease to receive) the balance or second half of the year's rent current at his death, there is no claim on his estate for repayment of a proportion of the rent. Nor could B.'s executor make any claim to an apportionment of the rent payable at Whitsunday after his death, because that rent was for the possession commencing at that date. The case of *Lord Herries v. Maxwell's curator*, 6th February 1873, 11 M. 396, appears somewhat opposed to this view, but that was the case of an arable farm with entry at Whitsunday and separation of crop, and rent payable at Martinmas and Whitsunday after entry. The owner died 18th July 1872,

having already become entitled to the whole year's rent from Whitsunday 1871 to Whitsunday 1872, and for crop 1872, and yet the Court held his executor entitled to a share of the next Martinmas rent (which was declared by the lease to be for the half-year preceding) corresponding to the period from Whitsunday to 18th July 1872.

By the third section of the Apportionment Act, the apportioned part of a rent became payable 'when the entire portion ' of which such apportioned part shall form part, shall become ' due and payable, and not before.' This by implication excludes from apportionment rents already received by the proprietor.

There is an exception to this, however, in the case of parties like heirs of entail, who are not entitled to alter the terms of rent payment to their own aggrandisement, but are bound to manage the estate *secundum bonum et æquum*.

In the case of arable farms, the crop is the dominant feature, and the variation in the harvest-time from year to year, and in different places has given rise to the adoption of a generally accepted rule, that Martinmas is the close of the crop-year.

*Case III.*—Arable Farm. Entry to houses and grass at Whitsunday 1888, and to arable land at separation of crop, 1888. Rent payable at Martinmas 1889 and Whitsunday 1890, for crop and year 1889. Proprietor died 31st December 1888. His representatives would receive at Martinmas 1889 out of the half-year's rent then payable, the proportion effeiring to the 50 days from 11th November to 31st December. In dealing with arable farms, the preparatory period from the Whitsunday of entry to the houses to Martinmas or separation of crop, when the tenant gets entry to the arable land goes for nothing, and the rent is held to accrue by equal daily increment from Martinmas to Martinmas, and is apportionable accordingly. The term of payment does not affect the question except in cases where under the lease the rent had

been paid in advance, in which case the executor of a deceased proprietor cannot be called upon to repay a proportion of such rents received in advance.

The legal authorities are at one in holding that a possession must be regarded as either pastoral or arable. There is no such thing recognised as a mixed holding. It is not easy, however, to reconcile with equity the ignoring of the possession of houses and grass from Whitsunday to Martinmas after entry in apportioning the rents of arable farms.

It is the practice in rent calculations to reckon Whitsunday as 15th May, and Martinmas as 11th November, these being the legal terms. But it is open to grave doubt whether for purposes of the Apportionment Act the removal terms 28th May and 28th November ought not to be taken. To take an extreme case, the proprietor of a shop rated at £500, died on 1st June. He had occupied the premises himself up to 28th May, the removal term, and had then given place to a tenant under a lease, who had contracted to pay a half-year's rent on 11th November and a half-year's rent on 15th May following. By the usual rule, this proprietor's executor would receive a proportion of the Martinmas rent equal to the period from 15th May to 1st June, although the proprietor had himself enjoyed the beneficial occupation from 15th May to 28th May. It would appear more equitable to make the calculation over the period of actual possession.

Prof. Rankine, in a note on page 311 of his book on Leases, states that as house rents are legally payable at Whitsunday of entry, and Martinmas thereafter for the year from Whitsunday to Whitsunday, the executors of an owner dying between Whitsunday and Martinmas would be entitled to the first half-year's rent, and in addition to an apportioned part of the second half-year's rent. Until this extreme view is confirmed by the Courts, accountants will doubtless apportion the rent according to the period of possession (*vide* opinion of Lord Deas, *Weir's Executors v. Durham*, 17th March 1870,

8 M. 729). By the Act, rents 'shall, like interest on money lent, ' be considered as accruing from day to day, and shall be apportionable in respect of time accordingly.' Interest on money lent implies that the use of the capital precedes the payment of interest. Rents are by the Act then to be considered as accruing like interest, which is impossible if, at the same time, a rent payable at Martinmas for the occupation of premises for the half-year from the preceding Whitsunday is to be considered as legally due at said preceding Whitsunday. That is to say there was no period over which it accrued at all. The Apportionment Act is equitable in its results, when the broad principle of apportionment, according to time of enjoyment, or earning which is clearly laid down in the interpretation clause is adhered to. The case of *Blaikie v. Farquharson*, 18th July 1849 (11 D. 1456), and Lord Fullerton's opinion in the case of *Campbell*, 18th July 1849 (11 D. 1453), are instructive, for they explode the idea that the Apportionment Acts were passed for the benefit of executors. These Acts were passed to make the law equitable to both heir and executor.

#### APPORTIONMENT OF BURDENS.

The 1834 Act provides that 'all just allowances and deductions in respect of charges on such rents, annuities, ' pensions, dividends,' &c., shall be made in the apportionment.

The 4th section of the 1870 Act, in providing for the recovering of the apportioned part, directs that 'proportionate ' parts of all just allowances' be deducted.

The rule is to calculate all taxes, interest, annuities, &c., as accruing from day to day over the period in respect of which they are declared or expressed to be made, and to charge the proportion prior to the date of death to executry.

*Annuities.*—If an annuity be declared payable half-yearly in advance, the executor of a proprietor, who had paid the annuity for the half-year current at the death, could not

recover the proportion effeiring to the period after the death from the next heir. This was decided in *Paul (or Hard) v. Anstruther*, 14th November 1862, 1 M. 14; Aff., 15th February 1864, 2 M., H.L. 1. This decision is consistent with the Apportionment Act, and with equity, for a proprietor could not recover from the annuitant's executor a proportion of the annuity paid in the event of the annuitant's death between terms.

In *Paul's* case, and also in *Learmonth v. Sinclair's Trustees*, 23rd January 1878, 5 R. 548, it was decided that the first payment of an annuity payable half-yearly, beginning the first term's payment at the first term after granter's death for the period preceding, fell to be apportioned between the personal representatives of the deceased heir of entail who granted the annuity and the succeeding heir, in the same way as the rents for the half-year current at his death.

*Interest.*—It was also held in last-cited case that the payment of interest on a bond, affecting the entailed estates for the half-year current, at the death of the heir in possession fell to be apportioned in the same way.

*Rent-Charge on Improvement Loan.*—In last-cited case it was held that the payment of rent-charge (capital and interest), for the half-year in which the entailed proprietor died, fell to be apportioned between his personal representatives and the succeeding heir of entail, according to the number of days he had survived the previous half-yearly payment.

In the previous case of *Maitland v. Maitland*, 1st February 1877, 4 R. 422, an opinion had been expressed that, by a construction of the Improvement Acts the instalments, both capital and interest, fell to be paid by the heir in possession at the date when each instalment fell due. Lord Gifford, however, in *Learmonth's* case, 5 R. 554, stated that the question did not really arise in *Maitland's* case.

*Public Burdens.*—In *Maitland's* case it was decided that the executors of a deceased proprietor of an entailed estate were

not liable for burdens effeiring to the possession after the date of death: nor were they liable for any part of an assessment imposed by consent of heritors after the date of death, though it was required partly to meet debts incurred prior to the date of death. Stipends are apportioned in a question between deceased proprietor's executors and next heir; but not in a question between the deceased incumbent's representatives and the next incumbent. If the incumbent survive Whitsunday, his executors draw the whole year's stipend, half as stipend and half as ann. If he survive Michaelmas, they draw the whole of that year's stipend, and, as ann, half of that for the following year. (*Latta v. Edinr. Eccles. Comrs.*, 5 R. 266, 30th November 1877.) In *Maitland's case*, 4 R. 426, it was held, 'as to the stipend, the executrix drew one-half of the rents for crop 1876, and must pay half the stipend.'

#### EXEMPTIONS UNDER THE APPORTIONMENT ACT, 1870.

Sec. VI. 'Nothing in this Act contained shall render appportionable any annual sums made payable in policies of assurance of any description.'

Sec. VII. 'The provisions of this Act shall not extend to any case in which it is or shall be expressly stipulated that no appportionments shall take place.'

INSTALMENT LOANS, RENT CHARGES, &c.

J. Low borrowed from the Edinburgh Mortgage Company £1000, to be repaid by six half-yearly payments of £181, 11s. The following state shows the extinction of the debt, and the principal and interest in each payment:—

		Interest.			Principal.		
		£	s.	d.	£	s.	d.
Sum borrowed, . . .	£1000 0 0						
Half-year's interest, . . .	25 0 0						
	£1025 0 0						
1st half-yearly payment, . . .	181 11 0	25	0	0	156	11	0
	843 9 0						
Half-year's interest, . . .	21 1 9						
	864 10 9						
2nd payment, . . .	181 11 0	21	1	9	160	9	3
	682 19 9						
Half-year's interest, . . .	17 1 6						
	700 1 3						
3rd payment, . . .	181 11 0	17	1	6	164	9	6
	518 10 3						
Half-year's interest, . . .	12 19 3						
	531 9 6						
4th payment, . . .	181 11 0	12	19	3	168	11	9
	349 18 6						
Half-year's interest, . . .	8 14 11						
	358 13 5						
5th payment, . . .	181 11 0	8	14	11	172	16	1
	177 2 5						
Half-year's interest, . . .	4 8 7						
	£181 11 0						
6th payment, . . .	181 11 0	4	8	7	177	2	5
		£ 89	6	0	1000	0	

Turning up a book of Tables of Annuities certain, such as those prepared by Mr Andrew Hugh Turnbull, manager of the Scottish Widows' Fund, you find that the interest paid on the amount of the loan from time to time remaining due is £5 per cent. If, then, you prepare a state in the form on page 81, adding each half-year's interest and deducting the sum paid, you will be able to ascertain how much of each payment is interest and how much is principal, and so be able to make the proper entries in your books.

J. Low would make the following entries in his books. When he received the £1000 it would be entered in his Cash Book, Dr. side, To Edinburgh Mortgage Company, Advance on Property to be repaid by six half-yearly sums of £181, 11s. each, £1000; and this sum would be posted to the credit of the Edinburgh Mortgage Company account for the loan, opened in Low's ledger.

When the first payment became due he would, through his journal, credit the Edinburgh Mortgage Company £25 of interest on the loan and debit his interest account £25, and when he paid the amount he would debit the Edinburgh Mortgage Company by posting from the cash book £181, 11s., being the first payment.

The same result would be obtained if J. Low could be trusted to pay promptly the amounts as they became due without making the Journal entry, if he split up the amounts in the cash book thus:—

By Edinburgh Mortgage Company, first repay-				
ment of principal, . . . . .	£156	11	0	
By Interest, on sum due to Edinburgh				
Mortgage Company for half-year, . . . . .	25	0	0	

The first entry posted to the debit of the Mortgage Company, £156, 11s., has the same effect as the Journal entry of interest to the credit and the cash-book entry of the whole payment of principal and interest to the debit, £181, 11s.

The advantage of the Journal entry, made when the interest



is due, is to show by J. Low's books the state of the accounts, though the sum be not paid when due.

In settling half-yearly or periodical payments of the nature above described, such as rent charges, income tax must be deducted from the interest at the rate of tax current during the period over which the interest accrued.

There is another method of effecting the division of the payments into repayment of principal and interest, which may be exemplified by using the same case.

	Principal.			Interest.		
	£	s.	d.	£	s.	d.
The first half-yearly payment is, . . . . .	£181	11	0			
Less interest for a half-year on £1000, . . . . .	25	0	0	25	0	0
1st repayment of principal, . . . . .	156	11	0			
Add interest thereon, . . . . .	3	18	3	21	1	9
2nd repayment, . . . . .	160	9	3			
Add interest thereon, . . . . .	4	0	3	17	1	6
3rd repayment, . . . . .	164	9	6			
Add interest thereon, . . . . .	4	2	3	12	19	3
4th repayment, . . . . .	168	11	9			
Add interest thereon, . . . . .	4	4	4	8	14	11
5th repayment, . . . . .	172	16	1			
Add interest thereon, . . . . .	4	6	4	4	8	7
6th repayment, . . . . .	£177	2	5			
	£1000	0	0	89	6	0

In analysing the former example, it was shown how the transaction would be treated in J. Low's books, and it will now be shown how the transaction is treated in the Company's books.

The amount advanced is entered in the cash book as paid to J. Low, and is entered to the debit of his loan account in the loan ledger. A current account, also in J. Low's name, is opened in the loan ledger. At the end of the first half-year the current account is debited through the Journal with the first payment £181, 11s., and the Loan account is credited with the repayment of principal £156, 11s., and Interest on Instalment Loans account, with the interest £25, as follows:—

Credit Interest on Instalment Loans, J.	
Low, half-year's interest on loan,	£25 0 0
" J. Low, loan account, Loan Ledger,	
1st repayment of principal, .	156 11 0
Debit J. Low, current account, 1st pay-	
ment, . . . . .	£181 11 0

When J. Low pays the sum due, £181, 11s., his current account is credited through the cash book.

## PROPERTY AND INCOME TAX.

This tax is payable on the profits derived from property, from trade, from investments, or from offices or employment. It is assessed for the year from 5th April to 5th April, and varies according to the exigencies of the Exchequer. It has been as high as 1s. 4d. at the time of the Crimean War, and as low as 2d. per £ in 1875 and 1876.

Incomes under £150 are exempt, and parties whose whole income from every source is under £400, are allowed an abatement of £120.

The tax is retained from interest (not casual) by the party paying the interest, who must account for the tax to Government. If tax be thus retained from, or be paid, in any way, by a party who is entitled to exemption or abatement, a claim can be made by him on the Inland Revenue for recovery of the tax at any time within three years of the close of the assessment year in respect of which recovery is claimed, 23 Vict. c. 14, § 10.

Printed forms to be used in making claims are supplied by the Inland Revenue. Taxpayers paying life assurance or deferred annuity premiums on own or wife's life are entitled to abatement in respect of premiums paid to an extent not exceeding one-sixth of their income, or to recover such tax by lodging a claim for repayment when their whole income has been charged with tax. The income of a married woman living with her husband is his income in the sense of the statutes.

Merchants must pay tax upon their whole profits according to the average of the last three years. They are not entitled to deduct an annuity or interest paid on loans before ascertaining profits. They must include such annuity or interest in their profits, and pay tax accordingly, but they are entitled to retain the tax from the persons to whom they pay the annuity or interest.

In the case where a merchant has earned in any year less profit than the average on which he was assessed, he may, at the end of the year, prove this, and have a new three years' average struck, including the unprofitable year in question. He will only obtain return of tax upon the difference between the three years' average before the year of assessment, and the three years' average including the year of assessment. Where a business has ceased during an assessment year, return of tax can also be claimed. 5 and 6 Vict. c. 35, §§ 133 and 134; 28 Vict. c. 30, § 6.

Farmers are taxed on their profits, which are held, for taxation purposes, to be one-half the annual value or rent in England, and one-third in Scotland. If their actual profits fall short of this, farmers may claim abatement in proportion to the deficiency. Practically, the tax is levied at reduced rates, Schedule B., on *the annual value*.

Interest on heritable bonds or mortgages is also subject to deduction of tax. For example:—A. owns a house assessed for property tax at £100, and has a loan of £1000 over it at 4 per cent., on which he pays £40 a year of interest to B. A. must

pay property tax on £100 to the Inland Revenue, but he retains from B. tax on £40 interest. The ultimate effect is that A. pays tax on £60, the extent of his real interest, and B. pays tax on £40, the income derived by him out of the subject of assessment. Interest on bonds is usually paid at 15th May (Whitsunday) and 11th November (Martinmas), and when the tax is altered the alteration takes effect from 5th April. It is proper, in calculating the tax in these cases, to divide the interest into the portion prior to 5th April and the portion thereafter accruing. As the two half years are unequal, it is necessary to go back on the previous half-year in the adjustment.

Tables published at each term are usually employed for the purpose of the calculation. The approximate practical rule is to take the tax for the whole period at the rate up to 5th April and add or deduct  $\frac{1}{9}$ th of the difference in rate over the whole year's interest. The number of days from 5th April to 15th May is 40, which is nearly one-ninth of a year. As  $\frac{1}{9}$  is rather more than  $\frac{40}{365}$ , the error in the result is to overstate the addition or deduction for the 40 days to the extent of one penny for every £657 of yearly interest when the difference of rate is one penny, and the year is not a leap year; 1d. on every £549 of interest when the year is a leap year.

Tax is deducted at the rate current when the interest falls due on dividends and interest from public funds, or from foreign loans or from foreign or colonial companies.

#### EXAMPLE I.

Deductions per £ of interest.

Year's interest to Whitsunday 1888, £1.

Tax at rate to 5th April 1888, as for one year, . 7d.

40 days out of 366 at 1d., . . . . . 10928

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6·89072

Half-year's interest to Whitsunday 1888, £1.

Tax at rate to 5th April 1888, . . . . . 7d.

40 days out of 366 at 1d. less on £2, . . . . . 21857

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6·78143

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## EXAMPLE II.

Interest at 4 per cent. on £20,000 for year to 15th

May 1887, . . . . . £800 0 0

Tax at 8d. rate current to 5th April, £26 13 4

Less 40 days at 1d., the rate having

been reduced to 7d. at 5th April

1887 ( $\frac{1}{9}$ th of 800 = 89)  $7/5$ . The

exact difference would be found

by taking  $\frac{40}{365}$  of 800 =  $7\frac{3}{4}$ , . . . . . 0 7  $3\frac{3}{4}$ 

---

26 6  $0\frac{1}{4}$ 

---

£773 13  $11\frac{3}{4}$ 

Same interest payable half-yearly, . . . . .

£400 0 0

Tax at 8d. rate up to 5th April 1887, £13 6 8

Less 40 days at 1d. on the year's

interest  $\frac{40}{365}$  of 800, . . . . . 0 7  $3\frac{3}{4}$ 

---

12 19  $4\frac{1}{4}$ 

---

£387 0  $7\frac{3}{4}$ 

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## EXAMPLE III.

Tax 7d., year to 5th April 1888. 6d., year to 5th  
April 1889.

Interest at 5 per cent. on £12,000 for one year, . . . £600 0 0

Tax at 7d. per £, . . . . . £17 10 0

Less 40 days out of 366 (1888

being a leap year) at 1d., there-

fore  $\frac{40}{366}$  of 600, . . . . . 0 5  $5\frac{1}{2}$ 

---

17 4  $6\frac{1}{2}$ 

---

£582 15  $5\frac{1}{2}$ 

---

 $\frac{1}{9}$ th of 600 =  $66\frac{1}{2}$  =  $5/6\frac{1}{2}$ .If the leap year had been neglected,  $\frac{40}{365}$  of  
600 =  $5/5\frac{3}{4}$ .Interest at 5 per cent. on £12,000 for half-year  
to Whitsunday 1888, . . . . .

£300 0 0

Tax at 7d. per £, . . . . . £8 15 0

Less 40 days at 1d. on £600, . . . . . 0 5  $5\frac{1}{2}$ 

---

8 9  $6\frac{1}{2}$ 

---

£291 10  $5\frac{1}{2}$ 

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## CONSIGNMENT ACCOUNTS.

Consignment Accounts are the records of transactions in goods consigned to a merchant for sale on account of another.

The consignee or merchant who receives the goods for sale acts as a factor or agent.

The transaction may be regarded from the point of view of the consignee, or from that of the merchant who sends the goods on consignment, and who is called the consigner.

## CONSIGNMENTS RECEIVED.

The merchant who receives goods for sale on account of others keeps the account of the consignment by opening an account in his ledger for the consignment, under some such head as—‘Sales for Pankoff;’ ‘Consignment from Rio, per *Juno* ;’ or, ‘J. Jones, Consignment per *Cotopaxi*.’

No entry is made to the credit of this account in the consignee's account books until the consignment or part of it is realised. The proceeds are then credited to the account.

When the consignee receives the goods he compares them with the invoice sent to him by the consigner, and makes an entry of them in his consignment stock book, keeping them entirely separate from his own stock.

The consignment account is debited with freight, insurance, and all charges incurred, and with commission, and is closed by debiting the remittance of the balance, or by a transfer of the balance to the credit of the consigner's personal account.

The account rendered to the consigner by the consignee is the account sales.

*Note.*—Some merchants enter the disposal of consignments received by crediting their general goods account and debiting the purchaser in the same way as in a sale of their own goods. The debit to the goods account is made when the account sales is prepared for rendering to the consigner, whose account is then credited. The objections to this method are—1. It is bad book-keeping to credit goods account with the sale of goods which are not already at the debit of that account. 2. It impairs the value of the goods account as a record of trading, which ought to show the gross profit arising from the sale of the merchant's own goods. 3. The agency business is distinct ; the profit thereon is commission, and ought to be shown in a separate account.

## EXAMPLE.

Account Sales of Hemp received *ex* Rail, and sold by Heriot & Watt  
for account and risk of R. Pankoff, Reval.

1882.			cwt.	qr	lb	£	s.	d.	£	s.	d.
Mar.	28	By Smith & Co. Petbg., P.—S. Hemp, O. Wc.	24	1	1	27	17	11			
		April 11, less 3 % discount,				0	16	10			
April	11	" Ireland & Co., do. do., Hemp, April 25, less 3 % discount,	173	3	26	200	1	7	27	1	1
						6	0	1	194	1	6
		<i>Charges.</i>									
		To Weighing at railway, 10 t. @ 1/, .				0	10	0	221	2	7
		" Scale dues on . . . 10 t. @ 1d., .				0	0	10			
		" Receiving into ware- house, . . . 10 t. @ 1/, .				0	10	0			
		" Weighing and deliver- ing, . . . 10 t. @ 1/, .				0	10	0			
		" Scale dues on . . . 10 t. @ 1d., .				0	0	10			
		" Warehouse rent and fire insur., .				2	9	7			
		" Tying up and repacking loose bales, " Advance and selling Com. 2½ % on £227, 19s. 6d., . . . .				0	3	9			
						5	14	0			
									9	19	0
		Nett proceeds due April 23/82, .							211	3	7
		DUNDEE, 30th May 1882. E. E.									

In Heriot & Watt's Journal the entries would be—

Sales for Pankoff. Dr. To Sundries,	£	9	19	0	£	1	15	5
To Charges, weighing, scale dues, packing, &c.,					2	9	7	0
" Rent and Insurance storage,					5	14		
" Commission,								
Sundries. Dr. To Sales for Pankoff—								
Smith & Co.,	27	1	1					
Ireland & Co.,	194	1	6		221	2	7	
Sales for Pankoff. Dr.,	211	3	7					
To R. Pankoff, nett proceeds due 23rd April								
1882,					211	3	7	

The result of these entries, if posted to ledger accounts, is that the consignment account headed 'Sales for Pankoff' is closed, and there appears at R. Pankoff's credit the nett proceeds. It may be assumed that cash payments and receipts have balanced the other entries above.

## CONSIGNMENTS MADE.

When a merchant consigns goods to an agent for sale on his own account and risk, he debits an account, headed 'shipment' or 'adventure' or 'consignment to,' for the cost (generally entered at market price at date of shipment) and for all charges connected with the consignment, and credits the same account for what he receives for them, the difference being carried to Profit and Loss.

For example—Heriot & Co., on 10th November 1884, sent 5 bales (3000 lbs.) twine to Dunedin for sale on consignment, the invoice price being 9d. per lb., £112, 10s.; paying packing, £1; freight, insurance, and shipping charges, £6, 4s. 9d. The account sales received from the agent, John Grant, at Dunedin, was as follows:—

Account Sales of 5 Bales Twine shipped per 'Dunedin,' from Glasgow to Dunedin, on account of Messrs Heriot & Co., Dundee.

2 Bales seaming Twine, 1,200 lbs. @ 11d.,	£55	0	0			
1 Bale Do., 600 lbs. @ 10½d.,	26	5	0			
2 Bales Do., 1,200 lbs. @ 9½d.,	47	10	0	£128	15	0
<i>Charges.</i>						
Lighterage and Harbour Dues,	£1	0	8			
Bond Charges and Cartage,	5	8	11			
Fire Insurance, £130,	1	6	0			
Commission and Guarantee,	9	13	1	17	8	8
Nett proceeds,				£111	6	4
By 60 days' sight Draft on London,				£111	6	4
E. & O. E.						

DUNEDIN, 12th March 1885.

(Signed) JOHN GRANT.

*Note.*—In the case of consignment accounts remaining open over the period of a balance it may be necessary to revalue the consignments. Those book-keepers who leave consignments at the debit of their goods account till sold, argue that the necessity for revaluation is more evident under their system, in which consignments appear for revaluation along with the ordinary stock. On the other hand, it is better to open separate consignment accounts, because there is a clear distinction between ordinary stock in warehouse and consigned goods.



Heriot & Co. would enter the foregoing transaction in their Journal thus:—

			£	s.	d.	£	s.	d.
1884.								
Nov.	10	Shipment to Dunedin Dr. to						
		Sundries, . . . . .	119	14	9			
		To Twine (3000 lbs. at 9d.), . .				112	10	0
		" Charges, Packing, . . . .				1	0	0
		" Cash, Freight Insurance and						
		Shipping Charges, . . . .				6	4	9
		And on receipt of the Account						
		Sales and Sight Draft.						
1885.								
May	12	Bills Receivable Dr., . . . .	111	6	4			
		To Shipment to Dunedin, . .				111	6	4
		Profit and Loss Dr., . . . .	8	8	5			
		To Shipment to Dunedin, Loss						
		on Twine, . . . . .				8	8	5

It will be observed that Heriot & Co., in addition, lost the interest of the money employed in the adventure from 10th November 1884 till the due date of the bill, 15th July 1885. (Bill presented in London 13th May, and therefore payable 12–15th July, 60 days after presentation and three days of grace.)

If the account sales arrived before the remittance, Heriot and Co. would credit the shipment account and debit the agent with the nett proceeds, crediting the agent with the remittance when received.

### JOINT ACCOUNTS.

Joint Adventures are special partnerships in which two or more parties agree to share the profit or loss arising out of a particular transaction agreed on. The joint adventurers are not known to the world as partners, and do not incur the same responsibility to third parties for the actings of one another as do ordinary partners in trade. The responsibility is limited to the joint adventure.

*Example.*—One member (A) of an equal share joint adven-

ture delivers, on 1st January 1889, a cargo of goods costing £1000, including charges, on board a ship belonging to the other member (B), who agrees to carry the goods to their destination at a freight of £300, due on arrival. The goods duly arrived on 1st April, and were sold *ex* the ship for a sum nett cash, which being remitted home by Bills to B, yielded £1500 on 1st July. B enters in his *Journal*—

1889.			£	s.	d.	£	s.	d.
Jan.	1	Joint Adventure with A Dr.,	1000	0	0			
		To A for Goods,				1000	0	0
Apr.	1	Joint Adventure with A Dr.,	300	0	0			
		To Freight,				300	0	0
July	1	Cash Dr.,	1500	0	0			
		To Joint Adventure with A,				1500	0	0
		Joint Adventure with A Dr. to Sundries,	200	0	0			
		To A for Interest on £1000,				25	0	0
		" Interest on Freight,				3	15	0
		" A for half profit,				85	12	6
		" Profit and Loss, my half profit,				85	12	6
		A Dr.,	1110	12	6			
		To Cash,				1110	12	6

*Ledger.*

JOINT ADVENTURE WITH A.

1889.			£	s.	d.	1889.			£	s.	d.
Jan.	1	To A for Goods,	1000	0	0	July	1	By Cash, nett proceeds,	1500	0	0
Apr.	1	" Freight,	300	0	0						
July	1	" A, Interest,	25	0	0						
		" Interest (on Freight),	3	15	0						
		" A, half profit,	85	12	6						
		" Profit and Loss, my half profit,	85	12	6						
			£ 1500	0	0				£ 1500	0	0

*Note.*—In actual practice the last four items on the Debtor side of the above Ledger account would be posted in slump, or entered in an inner column and extended as one sum.

A's account, on being written up, will be found to show no balance.

Many accountants object to the method of treatment of joint accounts above explained, on the ground that it does not disclose at each point the true legal position of the parties. At any time between 1st January and 1st April, they say, B's books kept as above would show that A was his creditor to the extent of £1000, whereas, in reality, if the goods perished, A could only recover one-half, or £500, from B in his capacity of joint adventurer, *leaving out of account B's liability as carrier, which is regulated by separate contract.*

It is stated in defence, however, that in respect the joint adventure with A shows £1000 at debit, half of which belongs to A, the ultimate result is the same as if that account only showed £500 at debit, and A's account only £500 at credit. To be logical, those who advocate the latter method ought to halve *all* the entries, both Dr. & Cr., but in practice they usually adopt a middle course, as follows:—

*Journal.*

			£	s.	d.	£	s.	d.
Jan.	1	Joint Adventure with A Dr., .	500	0	0			
		To A for my half cost, . . .				500	0	0
April	1	Joint Adventure with A Dr., .	300	0	0			
		To Freight on Cargo, . . .				300	0	0
July	1	Cash Dr., . . . . .	1500	0	0			
		To Joint Adventure with A, proceeds, . . . . .				1500	0	0
		Joint Adventure with A, Dr. to Sundries, . . . . .	700	0	0			
		To A, Interest on his Advance of £1000, . . . . .				25	0	0
		" Interest on Freight, . . .				3	15	0
		" A, half nett proceeds, . .				585	12	6
		" Profit and Loss, my half profit, . . . . .				85	12	6
		A Dr., . . . . .	1110	12	6			
		To Cash, . . . . .				1110	12	6

*Ledger.*

## A's Account.

1889.			£	s.	d.	1889.			£	s.	d.
July	1	To Cash, . . .	1110	12	6	Jan.	1	By Joint Adventure, B's half cost, . . .	500	0	0
						July	1	By Joint Adventure, Interest on Advance, . . .	25	0	0
								By half nett proceeds, . . .	585	12	6
			£ 1110	12	6				£ 1110	12	6

## PRACTICAL CASE. JOINT ACCOUNT.

The following example will illustrate the mode of treatment of Joint Accounts:—

In April 1885, Bell & Sime entered into an equal joint transaction, in oats, with John Clarke & Co. Bell and Sime acted as managers.

John Clarke & Co. advanced to Bell & Sime, on 1st May, £675, and paid freight, &c., £18, 17s. 5d., for the adventure. John Clarke & Co. sold  $499\frac{74}{336}$  qrs. of the oats at 23s. 3d., less  $1\frac{1}{4}$  per cent., to A. Davidson, due 16th May, £573, 1s. 9d.; and 200 qrs. to Wm. Watson at 3 months, due 2nd August, £232, 10s. These accounts were to be collected by Clarke & Co. direct. The remaining operations were conducted entirely by Bell & Sime. On 1st May they paid G. Gibson's invoice, £1490, 14s. 10d., and the following charges:—Sack hire, £1, 17s. 7d.; strings, 6s. 8d.; portorage on  $570\frac{3}{8}$  quarters *ex* quay, £3, 11s. 3d.; postages, &c., 10s.; insurance, 6s. 5d. On 29th April they sold to A. Wilson 50 qrs. at 23s. 3d., due 6th May, less  $1\frac{1}{4}$  per cent., £57, 8s. On 30th April, to J. Jack,  $422\frac{3}{8}$  qrs. at 23s. 3d. at 3 months, due 2nd August, £491, 0s. 2d.;

to J. Paterson, 200 qrs. at the same terms, £232, 10s.;  
to G. Gibson,  $1\frac{3}{4}$  at 22s., less  $1\frac{1}{4}$  per cent., due 16th May,  
£2, 1s. 5d.

Bell & Sime, in making up the account sales, ascertain the equated time of payment of the gross proceeds, and find it to be 2nd July. As they paid out their advances on 1st May, they ascertain the state of accounts on that day by charging interest on the £1588, 11s. 4d. from 1st May to 2nd July at  $3\frac{1}{2}$  per cent. = £9, 8s. 10d. This interest being entered, the total cost and charges are found to amount to £1525, 13s., and the nett profit to £62, 18s. 4d., which is equally divisible. Messrs Clarke and Co.'s half must be credited to them as on 1st May, and interest on Messrs Clarke & Co.'s account current must then be calculated up to 20th May, the date of settlement at current bank rates on 3 months' bills,  $3\frac{1}{2}$  per cent.

The average due date is found thus:—

		Days.	Products.
6th May, .	£57 8 0		
16th May, .	£573 1 9		
	2 1 5		
	<hr/>		
	575 3 2	10	5750
2nd August, £491 0 2			
	232 10 0		
	232 10 0		
	<hr/>		
	956 0 2	88	84128
	<hr/>		
	£1588 11 4		)89878(57
			10428

6th May + 57 days = 2nd July.

Interest on £1588, 11s. 4d. for 62 days from 1st May to 2nd July  
at  $3\frac{1}{2}$  per cent.

$$\frac{1588.566 \times 7 \times 62}{73000} = £9 \quad 8 \quad 10$$

The account sales and account current, as thus constructed, are as follows:—





The entries in Bell & Sime's books relating to the transactions are—

JOURNAL.

1885. May	1	Adventure in Oats (C. and Co.), . . . Dr.	£1525	13	0			
		To Cash, G. Gibson's Invoice, . . .				£1490	14	10
		To J. Clarke & Co., Freight, &c., . . .				18	17	5
		To Charges, . . .				6	11	11
		To Interest, . . .				9	8	10
		Cash, . . . Dr.	675	0	0			
		To John Clarke & Co., Sundries. Dr.				675	0	0
		A. Wilson, . . .	57	8	0			
		J. Jack, . . .	491	0	2			
		J. Paterson, . . .	232	10	0			
		G. Gibson, . . .	2	1	5			
		John Clarke & Co., A. Davidson, . £573 1 9 W. Watson, . 232 10 0	805	11	9			
		<u>£805 11 9</u>						
		To Adventure in Oats, Adventure in Oats (C. and Co.), . . . Dr.	62	18	4	1588	11	4
		To J. Clarke & Co., half profit, . . .				31	9	2
		To Profit and Loss, our half profit, . . .				31	9	2
		Interest, . . . Dr.	2	15	0			
		To John Clarke & Co.,				2	15	0

The cash entries in the Journal in the above and previous examples are made merely to complete the transactions in their simplest form. It is not usual to journalise cash in detail, but to post direct from Cash Book to Ledger.



## LEDGER.

## Adventure in Oats with Clarke &amp; Co.

1885.								
May	1	To G. Gibson's Invoice, .	£1490	14	10			
		" Freight, . . . .	18	17	5			
		" Charges, . . . .	6	11	11			
		" Interest, . . . .	9	8	10			
		By Sundries, gross proceeds, . . . .				£1588	11	4
		To John Clarke & Co., half profit, . . . .	31	9	2			
		To Profit and Loss, our half profit, . . . .	31	9	2			
			£1588	11	4	£1588	11	4
		JOHN CLARKE & Co.						
1885.								
May	1	By Cash Advance to Joint Adventure, . . . .				£675	0	0
		By Freight, &c., . . . .				18	17	5
		To Sales, Davidson, due 16th May, . . . .	£573	1	9			
		To Sales, W. Watson, due 2nd August, . . . .	232	10	0			
		By Half profit, . . . .				31	9	2
"	20	By Interest, . . . .				2	15	0
		By Balance, . . . .				77	10	2
			£805	11	9	£805	11	9
		To Balance, . . . .	£77	10	2			

According to the other method of treatment, p. 93, the rule is—

Debit joint adventure with the merchant's own share only of the first cost, and with the whole charges incurred while in his hands. Credit the same account with the whole proceeds.

Debit joint adventure, and credit the other joint adventurer with his share of the nett proceeds.

The balance on the adventure account is the merchant's profit or loss on the transactions, according as it falls on the debit or credit sides, and is carried to the credit or debit, as the case may be, of his profit and loss account.

Some accountants go through the form of charging each adventurer with his share of the first cost, debiting his account with his share, and crediting it again immediately when the joint adventure account is opened.

In the foregoing example, George Gibson's invoice would in the first instance be debited, half to Bell & Sime's goods account, and half to John Clarke & Co., and these accounts would then be immediately credited, and the debit of £1490, 14s. 10d. made to the joint adventure account. But that method is of no utility as disclosing liability from time to time; indeed it is rather deceptive, for when goods are ordered for a joint adventure, the joint adventurers are, as a rule, jointly and severally liable for the whole, and not merely each for his share. The simple method first described, then, seems also to be most accurate in its representation of the legal rights and liabilities of the parties.

T A B L E S  
OF  
LOGARITHMS AND ANTILOGARITHMS.

PROPORTIONAL PARTS.

Nat. Nums.	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
10	·0000	·0043	·0086	·0128	·0170	·0212	·0253	·0294	·0334	·0374	4	8	12	17	21	25	29	33	37
11	·0414	·0453	·0492	·0531	·0569	·0607	·0645	·0682	·0719	·0755	4	8	11	15	19	23	26	30	34
12	·0792	·0828	·0864	·0899	·0934	·0969	·1004	·1038	·1072	·1106	3	7	10	14	17	21	24	28	31
13	·1139	·1173	·1206	·1239	·1271	·1303	·1335	·1367	·1399	·1430	3	6	10	13	16	19	23	26	29
14	·1461	·1492	·1523	·1553	·1584	·1614	·1644	·1673	·1703	·1732	3	6	9	12	15	18	21	24	27
15	·1761	·1790	·1818	·1847	·1875	·1903	·1931	·1959	·1987	·2014	3	6	8	11	14	17	20	22	25
16	·2041	·2068	·2095	·2122	·2148	·2175	·2201	·2227	·2253	·2279	3	5	8	11	13	16	18	21	24
17	·2304	·2330	·2355	·2380	·2405	·2430	·2455	·2480	·2504	·2529	2	5	7	10	12	15	17	20	22
18	·2553	·2577	·2601	·2625	·2648	·2672	·2695	·2718	·2742	·2765	2	5	7	9	12	14	16	19	21
19	·2788	·2810	·2833	·2856	·2878	·2900	·2923	·2945	·2967	·2989	2	4	7	9	11	13	16	18	20
20	·3010	·3032	·3054	·3075	·3096	·3118	·3139	·3160	·3181	·3201	2	4	6	8	11	13	15	17	19
21	·3222	·3243	·3263	·3284	·3304	·3324	·3345	·3365	·3385	·3404	2	4	6	8	10	12	14	16	18
22	·3424	·3444	·3464	·3483	·3502	·3522	·3541	·3560	·3579	·3598	2	4	6	8	10	12	14	15	17
23	·3617	·3636	·3655	·3674	·3692	·3711	·3729	·3747	·3766	·3784	2	4	6	7	9	11	13	15	17
24	·3802	·3820	·3838	·3856	·3874	·3892	·3909	·3927	·3945	·3962	2	4	5	7	9	11	12	14	16
25	·3979	·3997	·4014	·4031	·4048	·4065	·4082	·4099	·4116	·4133	2	3	5	7	9	10	12	14	15
26	·4150	·4166	·4183	·4200	·4216	·4232	·4249	·4265	·4281	·4298	2	3	5	7	8	10	11	13	15
27	·4314	·4330	·4346	·4362	·4378	·4393	·4409	·4425	·4440	·4456	2	3	5	6	8	9	11	13	14
28	·4472	·4487	·4502	·4518	·4533	·4548	·4564	·4579	·4594	·4609	2	3	5	6	8	9	11	12	14
29	·4624	·4639	·4654	·4669	·4683	·4698	·4713	·4728	·4742	·4757	1	3	4	6	7	9	10	12	13
30	·4771	·4786	·4800	·4814	·4829	·4843	·4857	·4871	·4886	·4900	1	3	4	6	7	9	10	11	13
31	·4914	·4928	·4942	·4955	·4969	·4983	·4997	·5011	·5024	·5038	1	3	4	6	7	8	10	11	12
32	·5051	·5065	·5079	·5092	·5105	·5119	·5132	·5145	·5159	·5172	1	3	4	5	7	8	9	11	12
33	·5185	·5198	·5211	·5224	·5237	·5250	·5263	·5276	·5289	·5302	1	3	4	5	6	8	9	10	12
34	·5315	·5328	·5340	·5353	·5366	·5378	·5391	·5403	·5416	·5428	1	3	4	5	6	8	9	10	11
35	·5441	·5453	·5465	·5478	·5490	·5502	·5514	·5527	·5539	·5551	1	2	4	5	6	7	9	10	11
36	·5563	·5575	·5587	·5599	·5611	·5623	·5635	·5647	·5658	·5670	1	2	4	5	6	7	8	10	11
37	·5682	·5694	·5705	·5717	·5729	·5740	·5752	·5763	·5775	·5786	1	2	3	5	6	7	8	9	10
38	·5798	·5809	·5821	·5832	·5843	·5855	·5866	·5877	·5888	·5899	1	2	3	5	6	7	8	9	10
39	·5911	·5922	·5933	·5944	·5955	·5966	·5977	·5988	·5999	·6010	1	2	3	4	5	7	8	9	10
40	·6021	·6031	·6042	·6053	·6064	·6075	·6085	·6096	·6107	·6117	1	2	3	4	5	6	8	9	10
41	·6128	·6138	·6149	·6160	·6170	·6180	·6191	·6201	·6212	·6222	1	2	3	4	5	6	7	8	9
42	·6232	·6243	·6253	·6263	·6274	·6284	·6294	·6304	·6314	·6325	1	2	3	4	5	6	7	8	9
43	·6335	·6345	·6355	·6365	·6375	·6385	·6395	·6405	·6415	·6425	1	2	3	4	5	6	7	8	9
44	·6435	·6444	·6454	·6464	·6474	·6484	·6493	·6503	·6513	·6522	1	2	3	4	5	6	7	8	9
45	·6532	·6542	·6551	·6561	·6571	·6580	·6590	·6599	·6609	·6618	1	2	3	4	5	6	7	8	9
46	·6628	·6637	·6646	·6656	·6665	·6675	·6684	·6693	·6702	·6712	1	2	3	4	5	6	7	7	8
47	·6721	·6730	·6739	·6749	·6758	·6767	·6776	·6785	·6794	·6803	1	2	3	4	5	5	6	7	8
48	·6812	·6821	·6830	·6839	·6848	·6857	·6866	·6875	·6884	·6893	1	2	3	4	4	5	6	7	8
49	·6902	·6911	·6920	·6928	·6937	·6946	·6955	·6964	·6972	·6981	1	2	3	4	4	5	6	7	8
50	·6990	·6998	·7007	·7016	·7024	·7033	·7042	·7050	·7059	·7067	1	2	3	3	4	5	6	7	8
51	·7076	·7084	·7093	·7101	·7110	·7118	·7126	·7135	·7143	·7152	1	2	3	3	4	5	6	7	8
52	·7160	·7168	·7177	·7185	·7193	·7202	·7210	·7218	·7226	·7235	1	2	2	3	4	5	6	7	7
53	·7243	·7251	·7259	·7267	·7275	·7284	·7292	·7300	·7308	·7316	1	2	2	3	4	5	6	6	7
54	·7324	·7332	·7340	·7348	·7356	·7364	·7372	·7380	·7388	·7396	1	2	2	3	4	5	6	6	7

## TABLE OF LOGARITHMS.

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## PROPORTIONAL PARTS.

Nat. Nums.	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	2	2	3	4	5	5	6	7
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	2	2	3	4	5	5	6	7
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	1	2	2	3	4	5	5	6	7
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	1	1	2	3	4	4	5	6	7
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	1	1	2	3	4	4	5	6	7
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	1	1	2	3	4	4	5	6	6
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917	1	1	2	3	4	4	5	6	6
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	1	2	3	3	4	5	6	6
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	1	2	3	3	4	5	5	6
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	1	1	2	3	3	4	5	5	6
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	1	1	2	3	3	4	5	5	6
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	1	2	3	3	4	5	5	6
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	1	2	3	3	4	5	5	6
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	1	2	3	3	4	4	5	6
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	1	2	2	3	4	4	5	6
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	1	1	2	2	3	4	4	5	6
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	1	2	2	3	4	4	5	5
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627	1	1	2	2	3	4	4	5	5
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686	1	1	2	2	3	4	4	5	5
74	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745	1	1	2	2	3	4	4	5	5
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	1	1	2	2	3	3	4	5	5
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859	1	1	2	2	3	3	4	5	5
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915	1	1	2	2	3	3	4	4	5
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971	1	1	2	2	3	3	4	4	5
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	1	1	2	2	3	3	4	4	5
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	1	1	2	2	3	3	4	4	5
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133	1	1	2	2	3	3	4	4	5
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186	1	1	2	2	3	3	4	4	5
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	1	1	2	2	3	3	4	4	5
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289	1	1	2	2	3	3	4	4	5
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340	1	1	2	2	3	3	4	4	5
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	1	1	2	2	3	3	4	4	5
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	0	1	1	2	2	3	3	4	4
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	0	1	1	2	2	3	3	4	4
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538	0	1	1	2	2	3	3	4	4
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	0	1	1	2	2	3	3	4	4
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633	0	1	1	2	2	3	3	4	4
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680	0	1	1	2	2	3	3	4	4
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727	0	1	1	2	2	3	3	4	4
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	0	1	1	2	2	3	3	4	4
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	0	1	1	2	2	3	3	4	4
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	0	1	1	2	2	3	3	4	4
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908	0	1	1	2	2	3	3	4	4
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	0	1	1	2	2	3	3	4	4
99	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996	C	1	1	2	2	3	3	3	4

Logs.	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
·00	1000	1002	1005	1007	1009	1012	1014	1016	1019	1021	0	0	1	1	1	1	2	2	2
·01	1023	1026	1028	1030	1033	1035	1038	1040	1042	1045	0	0	1	1	1	1	2	2	2
·02	1047	1050	1052	1054	1057	1059	1062	1064	1067	1069	0	0	1	1	1	1	2	2	2
·03	1072	1074	1076	1079	1081	1084	1086	1089	1091	1094	0	0	1	1	1	1	2	2	2
·04	1096	1099	1102	1104	1107	1109	1112	1114	1117	1119	0	1	1	1	1	2	2	2	2
·05	1122	1125	1127	1130	1132	1135	1138	1140	1143	1146	0	1	1	1	1	2	2	2	2
·06	1148	1151	1153	1156	1159	1161	1164	1167	1169	1172	0	1	1	1	1	2	2	2	2
·07	1175	1178	1180	1183	1186	1189	1191	1194	1197	1199	0	1	1	1	1	2	2	2	2
·08	1202	1205	1208	1211	1213	1216	1219	1222	1225	1227	0	1	1	1	1	2	2	2	3
·09	1230	1233	1236	1239	1242	1245	1247	1250	1253	1256	0	1	1	1	1	2	2	2	3
·10	1259	1262	1265	1268	1271	1274	1276	1279	1282	1285	0	1	1	1	1	2	2	2	3
·11	1288	1291	1294	1297	1300	1303	1306	1309	1312	1315	0	1	1	1	2	2	2	2	3
·12	1318	1321	1324	1327	1330	1334	1337	1340	1343	1346	0	1	1	1	2	2	2	2	3
·13	1349	1352	1355	1358	1361	1365	1368	1371	1374	1377	0	1	1	1	2	2	2	3	3
·14	1380	1384	1387	1390	1393	1396	1400	1403	1406	1409	0	1	1	1	2	2	2	3	3
·15	1413	1416	1419	1422	1426	1429	1432	1435	1439	1442	0	1	1	1	2	2	2	3	3
·16	1445	1449	1452	1455	1459	1462	1466	1469	1472	1476	0	1	1	1	2	2	2	3	3
·17	1479	1483	1486	1489	1493	1496	1500	1503	1507	1510	0	1	1	1	2	2	2	3	3
·18	1514	1517	1521	1524	1528	1531	1535	1538	1542	1545	0	1	1	1	2	2	2	3	3
·19	1549	1552	1556	1560	1563	1567	1570	1574	1578	1581	0	1	1	1	2	2	3	3	3
·20	1585	1589	1592	1596	1600	1603	1607	1611	1614	1618	0	1	1	1	2	2	3	3	3
·21	1622	1626	1629	1633	1637	1641	1644	1648	1652	1656	0	1	1	2	2	2	3	3	3
·22	1660	1663	1667	1671	1675	1679	1683	1687	1690	1694	0	1	1	2	2	2	3	3	3
·23	1698	1702	1706	1710	1714	1718	1722	1726	1730	1734	0	1	1	2	2	2	3	3	4
·24	1738	1742	1746	1750	1754	1758	1762	1766	1770	1774	0	1	1	2	2	2	3	3	4
·25	1778	1782	1786	1791	1795	1799	1803	1807	1811	1816	0	1	1	2	2	2	3	3	4
·26	1820	1824	1828	1832	1837	1841	1845	1849	1854	1858	0	1	1	2	2	3	3	3	4
·27	1862	1866	1871	1875	1879	1884	1888	1892	1897	1901	0	1	1	2	2	3	3	3	4
·28	1905	1910	1914	1919	1923	1928	1932	1936	1941	1945	0	1	1	2	2	3	3	4	4
·29	1950	1954	1959	1963	1968	1972	1977	1982	1986	1991	0	1	1	2	2	3	3	4	4
·30	1995	2000	2004	2009	2014	2018	2023	2028	2032	2037	0	1	1	2	2	3	3	4	4
·31	2042	2046	2051	2056	2061	2065	2070	2075	2080	2084	0	1	1	2	2	3	3	4	4
·32	2089	2094	2099	2104	2109	2113	2118	2123	2128	2133	0	1	1	2	2	3	3	4	4
·33	2138	2143	2148	2153	2158	2163	2168	2173	2178	2183	0	1	1	2	2	3	3	4	4
·34	2188	2193	2198	2203	2208	2213	2218	2223	2228	2234	1	1	2	2	3	3	4	4	5
·35	2239	2244	2249	2254	2259	2265	2270	2275	2280	2286	1	1	2	2	3	3	4	4	5
·36	2291	2296	2301	2307	2312	2317	2323	2328	2333	2339	1	1	2	2	3	3	4	4	5
·37	2344	2350	2355	2360	2366	2371	2377	2382	2388	2393	1	1	2	2	3	3	4	4	5
·38	2399	2404	2410	2415	2421	2427	2432	2438	2443	2449	1	1	2	2	3	3	4	4	5
·39	2455	2460	2466	2472	2477	2483	2489	2495	2500	2506	1	1	2	2	3	3	4	5	5
·40	2512	2518	2523	2529	2535	2541	2547	2553	2559	2564	1	1	2	2	3	4	4	5	5
·41	2570	2576	2582	2588	2594	2600	2606	2612	2618	2624	1	1	2	2	3	4	4	5	5
·42	2630	2636	2642	2649	2655	2661	2667	2673	2679	2685	1	1	2	2	3	4	4	5	6
·43	2692	2698	2704	2710	2716	2723	2729	2735	2742	2748	1	1	2	3	3	4	4	5	6
·44	2754	2761	2767	2773	2780	2786	2793	2799	2805	2812	1	1	2	3	3	4	4	5	6
·45	2818	2825	2831	2838	2844	2851	2858	2864	2871	2877	1	1	2	3	3	4	5	5	6
·46	2884	2891	2897	2904	2911	2917	2924	2931	2938	2944	1	1	2	3	3	4	5	5	6
·47	2951	2958	2965	2972	2979	2985	2992	2999	3006	3013	1	1	2	3	3	4	5	5	6
·48	3020	3027	3034	3041	3048	3055	3062	3069	3076	3083	1	1	2	3	4	4	5	6	6
·49	3090	3097	3105	3112	3119	3126	3133	3141	3148	3155	1	1	2	3	4	4	5	6	6

## PROPORTIONAL PARTS.

Logs.	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
50	3162	3170	3177	3184	3192	3199	3206	3214	3221	3228	1	1	2	3	4	4	5	6	7
51	3236	3243	3251	3258	3266	3273	3281	3289	3296	3304	1	2	2	3	4	5	5	6	7
52	3311	3319	3327	3334	3342	3350	3357	3365	3373	3381	1	2	2	3	4	5	5	6	7
53	3388	3396	3404	3412	3420	3428	3436	3443	3451	3459	1	2	2	3	4	5	6	6	7
54	3467	3475	3483	3491	3499	3508	3516	3524	3532	3540	1	2	2	3	4	5	6	6	7
55	3548	3556	3565	3573	3581	3589	3597	3606	3614	3622	1	2	2	3	4	5	6	7	7
56	3631	3639	3648	3656	3664	3673	3681	3690	3698	3707	1	2	3	3	4	5	6	7	8
57	3715	3724	3733	3741	3750	3758	3767	3776	3784	3793	1	2	3	3	4	5	6	7	8
58	3802	3811	3819	3828	3837	3846	3855	3864	3873	3882	1	2	3	4	4	5	6	7	8
59	3890	3899	3908	3917	3926	3936	3945	3954	3963	3972	1	2	3	4	5	5	6	7	8
60	3981	3990	3999	4009	4018	4027	4036	4046	4055	4064	1	2	3	4	5	6	6	7	8
61	4074	4083	4093	4102	4111	4121	4130	4140	4150	4159	1	2	3	4	5	6	7	8	9
62	4169	4178	4188	4198	4207	4217	4227	4236	4246	4256	1	2	3	4	5	6	7	8	9
63	4266	4276	4285	4295	4305	4315	4325	4335	4345	4355	1	2	3	4	5	6	7	8	9
64	4365	4375	4385	4395	4406	4416	4426	4436	4446	4457	1	2	3	4	5	6	7	8	9
65	4467	4477	4487	4498	4508	4519	4529	4539	4550	4560	1	2	3	4	5	6	7	8	9
66	4571	4581	4592	4603	4613	4624	4634	4645	4656	4667	1	2	3	4	5	6	7	9	10
67	4677	4688	4699	4710	4721	4732	4742	4753	4764	4775	1	2	3	4	5	7	8	9	10
68	4786	4797	4808	4819	4831	4842	4853	4864	4875	4887	1	2	3	4	6	7	8	9	10
69	4898	4909	4920	4932	4943	4955	4966	4977	4989	5000	1	2	3	5	6	7	8	9	10
70	5012	5023	5035	5047	5058	5070	5082	5093	5105	5117	1	2	4	5	6	7	8	9	11
71	5129	5140	5152	5164	5176	5188	5200	5212	5224	5236	1	2	4	5	6	7	8	10	11
72	5248	5260	5272	5284	5297	5309	5321	5333	5346	5358	1	2	4	5	6	7	9	10	11
73	5370	5383	5395	5408	5420	5433	5445	5458	5470	5483	1	3	4	5	6	8	9	10	11
74	5495	5508	5521	5534	5546	5559	5572	5585	5598	5610	1	3	4	5	6	8	9	10	12
75	5623	5636	5649	5662	5675	5689	5702	5715	5728	5741	1	3	4	5	7	8	9	10	12
76	5754	5768	5781	5794	5808	5821	5834	5848	5861	5875	1	3	4	5	7	8	9	11	12
77	5888	5902	5916	5929	5943	5957	5970	5984	5998	6012	1	3	4	5	7	8	10	11	12
78	6026	6039	6053	6067	6081	6095	6109	6124	6138	6152	1	3	4	6	7	8	10	11	13
79	6166	6180	6194	6209	6223	6237	6252	6266	6281	6295	1	3	4	6	7	9	10	11	13
80	6310	6324	6339	6353	6368	6383	6397	6412	6427	6442	1	3	4	6	7	9	10	12	13
81	6457	6471	6486	6501	6516	6531	6546	6561	6577	6592	2	3	5	6	8	9	11	12	14
82	6607	6622	6637	6653	6668	6683	6699	6714	6730	6745	2	3	5	6	8	9	11	12	14
83	6761	6776	6792	6808	6823	6839	6855	6871	6887	6902	2	3	5	6	8	9	11	13	14
84	6918	6934	6950	6966	6982	6998	7015	7031	7047	7063	2	3	5	6	8	10	11	13	15
85	7079	7096	7112	7129	7145	7161	7178	7194	7211	7228	2	3	5	7	8	10	12	13	15
86	7244	7261	7278	7295	7311	7328	7345	7362	7379	7396	2	3	5	7	8	10	12	13	15
87	7413	7430	7447	7464	7482	7499	7516	7534	7551	7568	2	3	5	7	9	10	12	14	16
88	7586	7603	7621	7638	7656	7674	7691	7709	7727	7745	2	4	5	7	9	11	12	14	16
89	7762	7780	7798	7816	7834	7852	7870	7889	7907	7925	2	4	5	7	9	11	13	14	16
90	7943	7962	7980	7998	8017	8035	8054	8072	8091	8110	2	4	6	7	9	11	13	15	17
91	8128	8147	8166	8185	8204	8222	8241	8260	8279	8299	2	4	6	8	9	11	13	15	17
92	8318	8337	8356	8375	8395	8414	8433	8453	8472	8492	2	4	6	8	10	12	14	15	17
93	8511	8531	8551	8570	8590	8610	8630	8650	8670	8690	2	4	6	8	10	12	14	16	18
94	8710	8730	8750	8770	8790	8810	8831	8851	8872	8892	2	4	6	8	10	12	14	16	18
95	8913	8933	8954	8974	8995	9016	9036	9057	9078	9099	2	4	6	8	10	12	15	17	19
96	9120	9141	9162	9183	9204	9226	9247	9268	9290	9311	2	4	6	8	11	13	15	17	19
97	9333	9354	9376	9397	9419	9441	9462	9484	9506	9528	2	4	7	9	11	13	15	17	20
98	9550	9572	9594	9616	9638	9661	9683	9705	9727	9750	2	4	7	9	11	13	16	18	20
99	9772	9795	9817	9840	9863	9886	9908	9931	9954	9977	2	5	7	9	11	14	16	18	20

NEILL AND COMPANY, PRINTERS, EDINBURGH.



N O T E S

ON

MONEY, FOREIGN EXCHANGES,  
AND PRICES.

*PREPARED FOR THE CLASS OF PRACTICE OF COMMERCE,  
HERIOT-WATT COLLEGE, EDINBURGH.*

R. C. MILLAR,  
LECTURER.



J. MENZIES & CO., EDINBURGH AND GLASGOW.  
LONDON : SIMPKIN, MARSHALL, & CO.

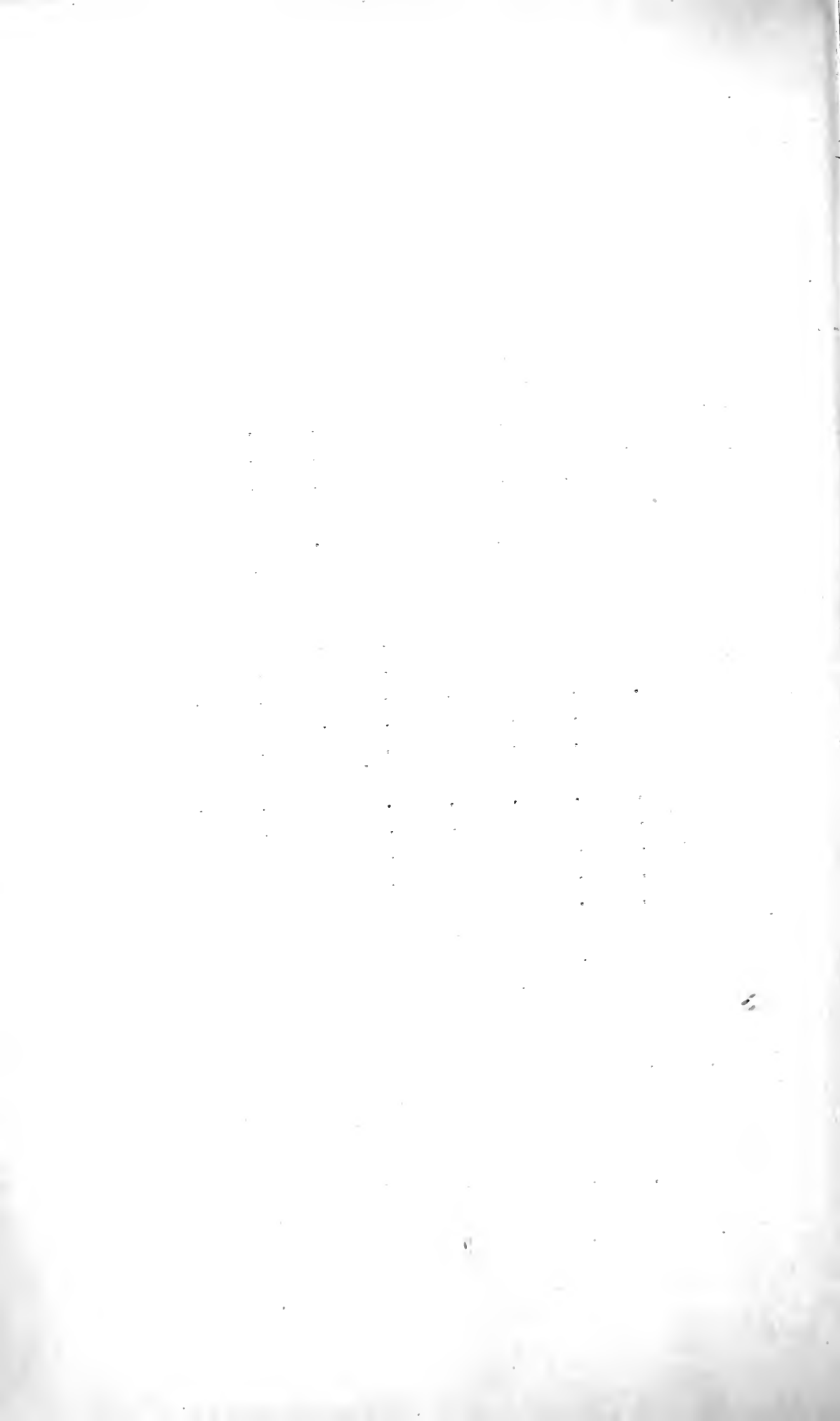
1891.



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# NOTES ON MONEY, FOREIGN EXCHANGES, AND PRICES.



## THE CHAIN RULE.

The chain rule is a simple method of working calculations which would otherwise involve several distinct reasonings out by the rule of three. The chain rule is found very useful in exchange calculations and price arbitrations. A case of barter furnishes a good illustration of the method. If one cow is equal to 200 hens, and 9 cows to 2 horses, and 3 horses to 180 sheep, how many hens are required to purchase 1 sheep? *Ans.* 15 hens.

$$\begin{array}{rcl}
 ? \text{ hens} & = & 1 \text{ sheep} \\
 180 \text{ sheep} & = & 3 \text{ horses} \\
 2 \text{ horses} & = & 9 \text{ cows} \\
 1 \text{ cow} & = & 200 \text{ hens} \\
 & & 10 \ 5 \\
 3 \times 9 \times 200 & & \\
 \hline
 180 \times 2 & = & 3 \times 5 = 15 \\
 20 & &
 \end{array}$$

It will be observed that the question, How many hens? is placed opposite the other term '1 sheep,' the equivalent of which, measured in hens, is required. The left hand term of the second line is 'sheep,' similar to the right hand term of the former line, and opposite to the '180 sheep' is placed the given equality '3 horses.' The third line must therefore commence with 'horses,' and the fourth with 'cows,' similar to the right

hand terms of the former lines. The fourth line, '1 cow' equals '200 hens,' completes the chain. The last term on the right must always be of the same denomination as the term required with which the chain begins.

The answer is obtained by multiplying together the numbers on the right hand side for a numerator and the numbers on the left hand side for a denominator. The quotient resulting from the division of the right hand products by the left hand products is the answer. Before multiplication any factors common to the left and right hand lines can be divided out. Thus, 9 divides out of 180, and the resulting 20 out of 200, which gives 10 to be divided by 2, leaving 5 and 3 only to be multiplied together. This exclusion of common factors is effected by cancelling. Vulgar Fractions may be got rid of by multiplying both sides by the denominators, or by reducing them to decimals.

The following example shows that the chain rule is a safe guide to the solution of questions involving direct proportion, and is in reality a form of the unitary method :—

If  $10\frac{1}{2}$  tons of coal cost £7, 17s. 6d., what is the price (1) per ton (2) of 30 tons?

$\begin{aligned} (1) \quad ? / &= 1 \text{ ton} \\ 10\cdot5 &= 157\cdot5 / \\ &= 15 / \text{ per ton.} \end{aligned}$	$\begin{aligned} (2) \quad ? £ &= 30 \text{ tons} \\ 10\cdot5 &= £7\cdot875 \\ &= £22, 10/ \end{aligned}$
---	---

There are, however, inverse proportions which require different treatment. For example, if a piece of work can be done by a certain number of labourers in a certain time, twice, thrice, or four times the number of labourers will perform the work in one half, one third, or one fourth of the time, and the half, third, &c., of the number will take double, triple, &c., of the time. The time is diminished as the number working is increased, and as the number diminishes the time required is increased. The time varies inversely as the number employed. So in the following case the mileage carried for a certain sum varies inversely as the weight. If £1 cover the cost of carriage

of 12 cwt. over 400 miles, how far should 20 cwt. be carried for the same sum? It is obvious that to state the case as before,

viz.  $\left\{ \begin{array}{l} ? \text{ miles} = 20 \text{ cwt.} \\ 12 = 400 \text{ miles,} \end{array} \right\}$  would lead to an absurd result.

There is really no equality between the 12 cwt. and 400 miles. To obtain the true result the 20 and 12 must be transposed.  $400 \times 12 \div 20 = 240$  miles. 12 cwt. carried 400 miles is equal to 1 cwt. for 4800 miles, and assuming the rate for larger quantities to be the same,  $\frac{1}{20}$ th of 4800 gives the mileage over which 20 cwt. can be carried for £1. The equality then may be stated thus:—

$$?(20 \text{ cwt.}) \text{ miles} = 400 (12 \text{ cwt.}) \text{ miles.}$$

In all calculations, methods of statement should be examined to test if they are reasonable, and results scrutinised to see that they are consistent.

A few miscellaneous examples may serve to indicate the scope and uses of the chain rule, and to prepare for its application to the important subjects of the Foreign Exchanges and arbitrage operations.

If a £10 share is quoted at £65, and the dividend is £2 per share per annum, what percentage would the shares yield at that price? *Ans.* £3, 1s. 6d. per cent.

$$? \text{ Interest} = £100 \text{ capital.}$$

$$65 = £2 \quad \frac{200}{65} \quad 3.076 \text{ per cent.}$$

What price can I give for 4 per cent. New Zealand stock so as to obtain  $3\frac{3}{4}$  per cent. interest on my capital? *Ans.* £106, 13s. 4d.

$$\text{How much capital} = £100 \text{ stock?}$$

$$100 = 4 \text{ pounds interest.}$$

$$3.75 = 100 \text{ capital.}$$

Raw coffee is quoted at 83s. 2d. per cwt. in bond, the duty is 14s. per cwt., and cost of roasting 2s. 6d. per cwt., 1 cwt. raw yielding 92 lb. roast, what is the cost per lb. of roast coffee? *Ans.* 1s. 1d. per lb.

? pence = 1 lb. roast.

92=112 raw converted.

$$112 = 1196 \text{ pence} = (83\text{s. } 2\text{d.} + 2\text{s. } 6\text{d.} + 14\text{s.}).$$

*Ans.* 13 pence.

If 307 U.S. dollars be equivalent to 396 Russian roubles, and 16 roubles=31 Dutch florins, and 22 florins=38 Reichsmarks, and 57 marks=70 francs, how many dollars are equivalent to 100 francs? *Ans.* \$18·86.

? Dollars = 100 francs.

70 = 57 marks.

38 = 22 florins.

31 = 16 roubles.

$$396 = 307 \text{ dollars.}$$
$$\$18.86 = 100 \text{ francs.}$$

If 11 lbs. English = 5 kilograms, and 1 kilogram = 2 German pounds, and 206 lbs. English = 100 seers, how many German pounds = 1 seer? *Ans.* 1.873.

? German pounds = 1 seer.

100 seers = 206 lbs. English.

11 = 5 kilograms.

1 = 2 German pounds.

$$= 1.873.$$

LEGAL TENDER.

Legal Tender money is what creditors are bound to accept in payment of debts expressed to be payable in money. In Britain, gold coin of full weight is legal tender to any amount; silver coin to the extent of 40s. in any one payment; and bronze coin to the extent of 12d. In England, but not in Scotland, Bank of England notes are also legal tender, except by the Bank of England, which must pay in gold if required.



Sovereigns and half-sovereigns are full value coins. Gold is purchased by the Bank of England at the rate of £3, 17s. 9d. per ounce standard (11 parts pure and 1 part alloy in 12 parts), but each ounce of gold coin as issued is equal to £3, 17s. 10½d. sterling. Coinage of gold is thus practically free, the 1½d. per ounce charged for coin in exchange for bullion being merely sufficient to cover the interest during the time occupied in coinage. British silver and bronze coins are tokens. Their current value as coins is much greater than that of the metal contained in them. The mint derives a large profit from the token coinage.

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### FOREIGN EXCHANGES.

For comparison with foreign moneys, the sovereign or pound sterling is the British standard unit of value as well as money of account and principal coin. Where shillings and pence are used in such comparisons, it is not silver or bronze coins which are meant, but proportionate parts of the gold pound sterling. In the case of Germany, which adopted the gold standard in 1871, the mark, which is the money of account and unit of value, is not represented by any gold coin, but only by a silver token; yet the marks referred to in exchange calculations are twentieth parts of 20-mark gold pieces. Similarly when it is said that—

The par of exchange between London and	{	Berlin is M.20·43 Stockholm is Kr.18·16 New York is \$4·86	}	per £.
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what is meant is not that the silver and other coins named are equal in value to £1 respectively, but that the pure metal contained in a sovereign is equal to the gold contained in M.20·43 German gold coin, or Kr.18·16 Scandinavian gold coin, or \$4·86 United States gold coin.

The par of exchange is the expression in the currency of one

country (say France or Britain) of that sum ( $f.25\cdot22$   $53\frac{1}{4}$  pence) which contains an amount of pure metal (gold) equal to a given sum ( $\pounds 1$  Milreis) taken as a standard of comparison in another (Britain Portugal).

The par of exchange is thus that sum in the currency of one country which, in real or intrinsic value, is equal to a given sum in the currency of another country. There can, therefore, be no fixed par of exchange betwixt countries which use different metals for their standards, while there is instability in the ratio of value of the metals.

The course of exchange expresses that sum in the currency of any country which *at a particular time* is equivalent to a given sum in the currency of another. The newspapers on Wednesdays and Fridays contain quotations of the course of exchange on London on the previous days. On comparing these from time to time it will be seen that the rates between London and the other places fluctuate. The fluctuations are chiefly caused by alterations in the supply of and demand for bills arising out of international indebtedness, state of credit, and rates of interest. For example, if London has imported largely American food-stuffs, then the London merchants will be competing for bills payable in dollars at New York. These bills will be at a premium, as there is a great demand for them wherewith to liquidate indebtedness to New York. At the same time the New York merchants will be offering for sale many bills drawn upon London merchants. Bills on London in New York will be at a discount.

If, again, the rate of interest in London be relatively low, Berlin bill-brokers will send over bills to be discounted in London, whereas if the rate of interest be high in London, other countries will send capital to London to be invested, and cease to discount bills there.

Direct exchanges are transactions such as have just been described,—the purchase or sale in one place of a bill payable in another place.

Indirect exchanges are operations between two places effected through the medium of another place, in which case it is called a simple arbitration, or, if more than one intermediate place be introduced, the transaction is called a compound arbitration.

The exchange between two places is said to be at par when a given sum in the money of one place will purchase a bill of exchange entitling the holder to receive in the other place an amount of the foreign money containing exactly the same quantity of the pure metal that is used for coin in both places. If a greater amount of foreign money be obtained, the exchange is said to be favourable to the first place.

The exchange is said to be  $\left\{ \begin{array}{c} \text{favourable} \\ \text{unfavourable} \end{array} \right\}$  to a place when a  $\left\{ \begin{array}{c} \text{smaller} \\ \text{larger} \end{array} \right\}$  amount of the currency of that place than the par of exchange indicates, is required to discharge a given amount in the foreign place.

The par of exchange with Paris is  $f.25.22\frac{1}{2}$ , and exchange will be 4 per mille in favour of London when the course of exchange on Paris rises to  $f.25.32\frac{1}{2}$ , and 4 per mille against London when it falls to  $f.25.12\frac{1}{2}$ . In this case Britain is said to receive the variable price from France. In the Portuguese exchange Britain gives the variable price. If the exchange with Portugal, as quoted in the London course of exchange, rises above the par of  $53\frac{1}{4}$  pence per milreis, this does not indicate a favourable but an unfavourable movement to London. These two cases must be carefully compared and contrasted. It will be observed that to the London merchant francs and milreis are like commodities which he buys or sells according as he has a debt to pay in the foreign country or a sum of money to obtain from it. The quotation for francs is similar to the common quotation for fish, so many for a shilling: the more given for the shilling, the cheaper is the price—the more favourable the purchase. The quotation per milreis, on the other hand, is like the quotation of a price per lb. or per dozen: the higher the price, the more unfavourable is the purchase.

In exchange operations the distinction is that the francs, milreis, &c., bought or sold are not coin on the spot, but value in the foreign country. It is in the power of the London merchant, wishing to convert, into sterling money, francs payable in Paris, to obtain gold napoleons in Paris, transmit them to London, and sell them to the mint for sovereigns. This operation will cost him the expense of obtaining gold in Paris, and the carriage and insurance to London, and of obtaining sovereigns in exchange for French gold.

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### BULLION POINTS.

Metal points or specie points are the limiting points of fluctuation, up or down, of the foreign exchanges between two places using the same money metal as standard of value. The fluctuation cannot in general exceed the par of exchange, plus or minus the cost of transmitting the common money metal.

Germany, like Britain, has a gold standard. The par of exchange is M.20·42945 per £ or £1000 = M.20429·45. If a merchant in Berlin require to remit £1000 to London, he will endeavour to procure bills or notes payable in London; but, if there be a very great demand for these, the price asked may be more than M.20·42945 per £. If bills be scarce the Berlin merchant would be willing to pay somewhat more than par, but there is a limit beyond which he will not go, and that is the par of exchange, plus the cost of remitting gold, including charges. The cost of transmission between London and Berlin including charges is nearly 5 per mille. So that the Berlin merchant who had to send £1000 to London would not give more than M.20,520 for a bill for £1000 on London, because he can send over gold equal to £1000 for that sum.

If, on the other hand, the Berlin merchant had money to

receive in London, he would not sell a £1000 bill for less than M.20,330, for 1000 sovereigns would realise that amount in Berlin after paying freight and charges.

The following are the standards for gold points of the four principal gold exchanges—

FRENCH.	GERMAN.	AMERICAN.	AUSTRALIAN.
For us, $f.25\cdot32\frac{1}{2}$ , 4 p. mille.	M.20·52, 5 p. mille.	\$4·89, 5 p. mille.	£102
Par, $f.25\cdot22\frac{1}{2}$	20·43.	4·8665.	
Against us, $f.25\cdot12\frac{1}{2}$ , 4p.mille.	20·33, 5 p. mille.	4·827, 8p.mille.	

When the Paris Exchange falls below  $25\cdot12\frac{1}{2}$  gold tends to leave London for Paris, and when it rises above  $25\cdot32\frac{1}{2}$  the tendency is for gold to be brought from Paris to London; but as the Bank of France is not bound to cash its notes in gold, that metal is usually at a premium in Paris, and consequently the exchange may rise above  $25\cdot32\frac{1}{2}$  without any movement of gold from Paris.

## CALCULATION OF PARS OF EXCHANGE.

BRITISH MONEY.—What is the value per oz. of pure gold, if standard gold (916·66 or 22 carats, fine) be £3, 17s. 10½d. per oz. ?

? £ = 1 oz. pure gold.

11 = 12 oz. standard.

$$1 = £3\cdot89375 \quad \frac{3\cdot89375 \times 12}{11} = £4, 4s. 11\frac{1}{4}d.$$

What is the weight of a sovereign in grains ? 40 lbs. Troy of standard gold are coined into 1869 sovereigns. *Ans.* 123·274 grains.

$$? \text{ grs.} = \text{£}1.$$

$$1869 = 40 \text{ lbs.}$$

$$1 = 12 \text{ oz.}$$

$$1 = 20 \text{ dwts.}$$

$$1 = 24 \text{ grs.}$$

How many grains of pure gold in a sovereign? *Ans.* 113·0016 grains.

$$? \text{ grains pure gold} = 1 \text{ sovereign.}$$

$$1 = 123·274 \text{ gr. standard.}$$

$$\frac{12 = 11 \text{ pure.}}{= 113·0016.}$$

By statute 66 shillings are coined out of 1 pound Troy of standard silver (925 millesimal fineness or  $\frac{37}{40}$  pure), that is at the rate of 5s. 6d. per oz. What is the value of the silver in 20s. when silver sells at 3s. 6d. per oz. standard? *Ans.* 12s. 8 $\frac{3}{4}$ d.

$$? \text{ £} = 20/ \text{ silver.}$$

$$66/ = 1 \text{ pound silver.}$$

$$1 \text{ lb.} = 12 \text{ oz.}$$

$$1 \text{ oz.} = \text{£}·175 \text{ (i.e., } 3/6\text{).}$$

$$\frac{20 \times 12 \times ·175}{66} = \frac{42}{66} = ·636.$$

$$\text{£}·636 = 12/8\frac{3}{4}.$$

If 1 oz. of gold  $1\frac{1}{2}$  fine = £3, 17s. 10 $\frac{1}{2}$ d., and 1 oz. silver  $\frac{37}{40}$  fine = 3s. 6d., how many ounces of pure silver are equal to 1 oz. pure gold? *Ans.* 22 $\frac{1}{2}$  ozs.

$$? \text{ oz. pure silver} = 1 \text{ oz. pure gold.}$$

$$11 = 12 \text{ oz. standard.}$$

$$1 = \text{£}3·89375.$$

$$·175 = 1 \text{ oz. standard silver.}$$

$$40 = 37 \text{ oz. pure silver.}$$

FRANCE.—In France 3100 francs are coined out of 1 kilogram of gold 900 fine. What is the mint par of exchange between Paris and London; or, how many francs contain as much pure gold as 1 sovereign? *Ans.* 25·2215.

? francs = £1.

1 = 113·0016 grains pure.

1 gr. = ·0647989 gram pure.

900 = 1000 (900 fine).

1000 = 3100 francs.

$$\frac{113\cdot0016 \times \cdot0647989 \times 31}{9} = 25\cdot2215.$$

In France, from 1803 to 1874, gold and silver were coined at the mint to all comers—

1 kilo. of gold into 3100 francs. } Silver being rated to gold  
1 kilo. of silver into 200 francs. } as 15½ to 1.

Since 1874 the free coinage of silver has been suspended, though silver 5-franc pieces are still unlimited legal tender.

At the rate of 15½ of pure silver to 1 of pure gold, what would be the price of standard silver expressed in British sterling? *Ans.* 5/0⅞.

? £ = 1 oz. standard silver.

40 = 37 oz. pure silver.

15½ = 1 oz. pure gold.

11 = 12 oz. standard gold.

1 = £3·89375.

= 5/0⅞d.

How many pence in one franc? *Ans.* 9½d.

? pence = 1 franc.

3100 = 1000 grams (900 fine).

1000 = 900 pure.

1 gram = 15·432349 grains.

113·0016 = 240 pence.

= 9½ pence.

What is the value of the French gold 20-franc piece at £3, 17s. 10½d. per oz.? *Ans.* 15/10¼.

? £ = 1 napoleon.

155 = 1000 grams (900 fine).

1000 = 900 grams pure.

1 = 15·432349 grains pure.

113·0016 = £1.

$$\frac{900 \times 15\cdot432349}{155 \times 113\cdot0016} = \cdot793. = 15/10\frac{1}{4}.$$

Exchange £1876 into francs at exchange 25 (that is 25 francs = £1). At exchange 25, the rule is add 2 ciphers and divide by 4 = f.46,900.

Exchange £1000 into francs at 25·28. *Ans.* f.25,280.

Exchange f.73,565 into sterling at 25. Rule, multiply by 4 and strike off 2 figures, £2942·60 = £2942, 12s.

GERMANY.—Germany has a gold standard of currency. By the law of 4th December 1871, 1 kilogram of gold 900 fine is coined into 125·55 pieces of 20 marks. What is the mint par between England and Germany? *Ans.* 20·43 marks = £1.

? marks = £1.

1 = 113·0016 grains pure.

grain 1 = ·0647989 grams.

900 = 1000 (900 fine).

1000 = 2511 marks (125·55 × 20).

= 20·42945, nearly 20·43.

Express 20 marks in sterling? *Ans.* 19/6  $\frac{9}{10}$ .

? shillings = 1 twenty mark piece.

125·55 = 1000 grams German gold coin.

1000 = 900 grams pure gold.

1 = 15·432349 grains.

113·0016 = 20 shillings.

$\frac{900 \times 15 \cdot 432349 \times 20}{125 \cdot 55 \times 113 \cdot 0016} = 19/6 \frac{9}{10}$ .

NETHERLANDS.—In Holland 1653·439 florins are coined out of a kilogram of pure gold reduced by alloy to 900 fine. What is the mint par between England and Holland? *Ans.* fl.12·1071 per £.

? Fl. = £1.

1 = 113·0016 grains pure gold.

1 = ·0647989 gram.

1000 = 1653·439 florins.

Fl. 12·1071 = £1.

*Note.*—The florin or guilder is divided into 100 cents or 20 stivers. In the London course of exchange the quotation is in florins and stivers.



What is the value of the gold 10-florin piece weighing 6·720 grams, 900 fine? *Ans.*  $16/6\frac{1}{4}$ .

$$? \text{ £} = 10 \text{ Fl.}$$

$$10 = 6\cdot720 \text{ grams (900 fine).}$$

$$1000 = 900 \text{ grams pure.}$$

$$1 = 15\cdot432349 \text{ grains.}$$

$$113\cdot0016 = \text{£}1.$$

$$= \text{£}826 \text{ or } 16/6\frac{1}{4}\text{d.}$$

SCANDINAVIAN UNION.—In Norway, Sweden, and Denmark, 1 kilogram fine gold is coined into 2480 kroner in 10 and 20 kroner pieces, the metal being reduced to a fineness of 900. What is the par of exchange with Britain?  $\text{£}1 = 18\cdot159$  kroner.  $10 \text{ kr.} = 11\text{s. } 0\cdot164\text{d.}$

$$? \text{ Kroner} = \text{£}1.$$

$$1 = 113\cdot0016 \text{ grains pure.}$$

$$1 = \cdot0647989 \text{ gram.}$$

$$1000 = 2480 \text{ kroner.}$$

$$= 18\cdot159 \text{ kr. } \text{£}1.$$

$$? \text{ pence} = 10 \text{ kr.}$$

$$2480 = 1000 \text{ grams.}$$

$$1 = 15\cdot432349 \text{ grains.}$$

$$113\cdot0016 = 240 \text{ pence.}$$

$$= 132\cdot164 \text{ pence.}$$

SPAIN.—In the London course of exchange the Spanish rate is quoted in pence per duro peso or hard dollar of 5 pesetas (francs). In the Spanish bourses the rate is quoted like the French and Italian exchanges in pesetas and centimos per  $\text{£}$  sterling. By law, 1 kilo. of gold 900 fine makes 3100 pesetas. It has been found that  $25\cdot2215 \text{ francs} = \text{£}1$ ,  $25\cdot2215 \text{ pesetas} = \text{£}1$ . How many pence = 1 duro or 5 pesetas? *Ans.*  $47\cdot578 \text{ pence.}$

$$? \text{ pence} = 1 \text{ duro.}$$

$$1 = 5 \text{ pesetas.}$$

$$3100 = 1 \text{ kilo (900 fine).}$$

$$1 \text{ kilo} = 900 \text{ grams pure.}$$

$$1 \text{ gram} = 15\cdot432349 \text{ grains.}$$

$$113\cdot0016 = 240 \text{ pence.}$$

$$= 47\cdot578 \text{ pence per duro.}$$

## 18 NOTES ON MONEY, FOREIGN EXCHANGES, AND PRICES.

PORTUGAL.—A Portuguese gold half-crown = 5 milreis has a legal weight of 8·868 grams 916·66 fine. What is the London par of exchange with Lisbon in pence per milreis? *Ans.* 53·28d.

$$? \text{ pence} = 1 \text{ milreis.}$$

$$5 = 8·868 \text{ grams standard.}$$

$$1 = 15·432349 \text{ grains.}$$

$$480 = 1 \text{ oz.}$$

$$12 = 1 \text{ lb. troy.}$$

$$40 = 1869 \text{ sovereigns.}$$

$$1 = 240 \text{ pence.}$$

$$= 53·28 \text{ pence per milreis.}$$

$$4500 \text{ reis or } 4\frac{1}{2} \text{ milreis per } \pounds.$$

THE AMERICAN DOLLAR.—In the United States the \$10 piece of gold weighs 258 grains troy 900 fine. Determine the mint par between New York and London. *Ans.* \$4·86<sup>65</sup> per £1.

$$\text{\$?} = \pounds 1.$$

$$1 = 113·0016 \text{ grains pure gold.}$$

$$900 = 1000 \text{ grains American gold coin.}$$

$$258 = 10 \text{ dollars.}$$

$$= \$4·86^{65} \text{ per } \pounds 1.$$

What is the value of the gold United States dollar in sterling?  
*Ans.* 49·316d.

$$? \text{ pence} = \$1.$$

$$10 = 258 \text{ grains coin.}$$

$$1000 = 900 \text{ grains pure.}$$

$$113·0016 = 240 \text{ pence.}$$

$$= 49·316.$$

## COMPARISON OF BRITISH MONEY WITH THAT OF SILVER STANDARD COUNTRIES.

INDIA.—The rupee contains (180 grains silver  $\frac{1}{2}$  fine) 165 grains pure silver. What is its value at  $3/6\frac{1}{2}$  per oz. standard?  
*Ans.*  $1/3\frac{3}{4}$ .

? pence = 1 rupee.

1 = 165 grains fine.

37 = 40 standard.

480 =  $42\frac{1}{2}$  pence.

THE MEXICAN DOLLAR.—What is the value of the silver Mexican dollar used in China and Straits Settlements? Its weight is 417·5 grains 900 fine. Price of silver, 42 pence per oz. standard. *Ans.*  $2/11\frac{1}{2}$ . At  $5/ = 4/2\frac{3}{4}$ .

RUSSIA.—The silver rouble contains 19·99 grams silver 900 fine. What is its value at  $3/6$  per oz. standard? *Ans.*  $2/2\frac{1}{4}$ .

CHINA.—The Canton tael is 580 grains silver say 930 fine. What rate of exchange is given by a quotation of silver at  $3/6$  per oz.? *Ans.*  $4/3$  per tael. At  $5/$  per oz.? *Ans.*  $6/0\frac{3}{4}$ .

JAPAN.—The Japanese silver yen weighs 416 grains 900 fine. What rate of exchange is given by silver at  $3/6$  per oz.? *Ans.*  $2/11\frac{1}{2}$ . At  $4/2$  per oz.? *Ans.*  $3/6\frac{1}{4}$ .

The foregoing examples are intended to serve as illustrations of the manner in which the moneys of the different countries of the world are related to one another; and as a guide to the proper understanding of the Tables of foreign moneys and exchanges to be found in almanacs and books of reference.

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## INCONVERTIBLE PAPER CURRENCY.

Paper money, whether issued by a Bank or by a State, ought to be kept within such limits as will ensure its due conversion into hard money on demand. Where there is no obligation to pay the notes in coin, or where specie payments have been suspended, the notes are said to be inconvertible. Where notes are inconvertible, over-issue is apt to take place, and over-issue of inconvertible notes results in their depreciation. This depreciation, which is accompanied by a rise in prices measured in paper

money, becomes apparent by the premium which holders of coin exact from those who wish to exchange paper for coin. The premium in such circumstances fluctuates, and as happened in the Argentine Republic recently, and in the United States at the time of the Civil War, the fluctuations may be wide, greatly disturbing trade. It is possible to compare British sterling money with Argentine inconvertible paper money only by reference to the premium on gold in the Republic at a particular time. For example, with exchange on London at \$5 per £, what is the value in sterling of the paper dollar when the gold premium is 150? That is, when the gold rate is 250, or 250 paper dollars equal to 100 gold dollars.

$$\begin{aligned} ? / &= \$ \text{ paper.} \\ 250 &= \$100 \text{ gold.} \\ 5 &= 20/ \\ &= 1/7\frac{1}{4} \end{aligned}$$

*Examples of Equivalents in Sterling.*

Spain,	.	P. 52,789 @ 45½d. ₧ duro,	=	£2001	11	7
Portugal,	.	Reis 427 \$ 254 @ 52d. ₧ milreis,	=	92	11	5
India,	.	R. 513 @ 1/5 ₧ rupee,	=	36	6	9
Russia,	.	Ro. 1,000 @ 28d. ₧ rouble,	=	116	13	4
„	.	Ro. 46,525 @ Ro. 93·05 ₧ £10,	=	5000	0	0
France,	.	F. 52,791·50 @ 25·45,	=	2074	6	6
Netherlands,	.	Fl. 596·56 cents @ Fl. 12·2 stiv.,	=	49	6	1
Germany,	.	M. 5,984 @ 20·40,	=	293	6	8
Italy,	.	L. 127,974·40 @ 25·80,	=	4960	4	11

## ARBITRAGE OPERATIONS.

Arbitrage means the comparing of the prices current at one place with those of another, by means of a calculation which has regard to all the factors involved, and will show whether any projected transaction will result in loss or gain.

Bankers and brokers are chiefly concerned with Arbitrations

in Bills, in Stocks and Shares, or in the precious metals. Merchants, on the other hand, are occupied with Arbitrations of Prices of Merchandise.

**DIRECT EXCHANGES.**—If a London merchant requires to pay a debt owing by him to a Berlin merchant, he may either remit the money to Berlin or ask the Berlin merchant to draw upon him. The draft or remittance in either case may be by sight draft or cheque, to which the ‘short’ quotations in the course of exchange apply, or by three months’ or other long-dated bills. If the short exchange is to be used, the question as to which method—drawing or remitting—ought to be followed may be illustrated thus: On a particular day cheques on Berlin were dealt in at London at M.20·46, and cheques on London fetched M.20·43 in Berlin. To make a remittance on that day from London to Berlin by buying up a cheque on Berlin at M.20·46 would appear 3 pf. per £ better than for the Berlin merchant to draw. Again, on the same day to obtain payment of a debt due by a Berlin merchant to a London merchant, it seems more advantageous for the Berlin merchant to remit cheques upon London at 20·43 than for the London merchant to draw upon Berlin ‘short’ and sell the draft at M.20·46. The brokerage may be disregarded in the comparison being the same in each case. The apparent advantage must be reduced by about 1 pf. per £ on account of the interest between the date of drawing and presentment of a draft. The risk of drafts being dishonoured also has effect. When these allowances are made, it is found that the short quotations for drafts or remittances are usually level.

If, on the other hand, three months’ bills are employed, it is necessary to reduce the quotations to ‘short’ prices. The rate on Berlin for three months’ paper in London on 22nd July 1890 was 20·66, and on the Berlin Bourse three months’ bills on London were quoted at 20·23. Assuming 4 per cent. to be the rate at both places, to get the short price, 4 per cent. for three months (*i.e.*, 1 per cent.) must be deducted from the London rate— $20·66 - ·2066 = 20·45$ , and added to the Berlin rate

$20\cdot23 + \cdot2023 = 20\cdot43$ . The comparison then proceeds as already explained for short quotations.

The deduction of 1 per cent. from the London rate is made because if the bill be sent to Berlin and discounted there M.20·66 will only yield M.20·45; and the interest is added to the Berlin rate because 20·23 represents £1 due in London three months hence, and a larger sum by 1 per cent. must be paid to obtain a sum which being discounted in London will yield £1 on the spot.

In dealing with Portugal, Russia, or India, however, where the sterling money is the variable term, the allowance for interest is adjusted in a manner opposite to that just explained in the case of Berlin. A glance at the course of exchange confirms this:—

Exchange on Lisbon, three months— $52\frac{1}{4}$ d. per milreis.

Par  $53\frac{1}{4}$ d.

Exchange on Berlin, three months—M.20·66.

Par 20·43.

In order to obtain 1 milreis to-day in Lisbon it is necessary to pay more pence in London than are required to provide 1 milreis in Lisbon three months hence.

INDIRECT EXCHANGES.—A simple arbitrated rate of exchange is that obtained by drawing or remitting from one place to another through the medium of a place interposed, and the purpose is to effect the operation more advantageously than by direct exchange.

The arbitrated price is the term applied to the rate of exchange arising from indirect operations in long bills. The arbitrated par of exchange is applied to the rate deduced for short paper.

What is the arbitrated price of bills on Paris in London?

On a certain day Hamburg quotes short bills on Paris M.81·10 for F.100; and in London three months' bills on Paris are quoted F.25·45 p. £1, and bills on Hamburg, in marks, for the same amount, the short quotation being 20·40.

If bills on Paris at sight are quoted 81·10 in Hamburg, bills

on Paris at three months would be cheaper by as much as three months' interest at the Paris rate (4 ), or 0·81; so that three months' bills on Paris would be equal to 80·29 in Hamburg.

The following chain gives the arbitrated price :—

$$\begin{aligned} \text{Francs } 3/\text{mo. ?} &= \text{£1.} \\ \text{If } \text{£1} &= 20\cdot40 \text{ M. short,} \\ \text{and M. short } 80\cdot29 &= 100 \text{ francs } 3/\text{mo.,} \\ \text{or } 20\cdot40 \times 100 &= \text{francs } 25\cdot408. \\ \hline &80\cdot29. \end{aligned}$$

The same result would be found by the short exchange as follows :—

$$\begin{aligned} \text{Francs short ?} &= \text{£1 sterling.} \\ \text{If } \text{£1} &= 20\cdot40 \text{ M. short,} \\ \text{and M. short } 81\cdot10 &= 100 \text{ francs short,} \\ \text{or } \frac{20\cdot40 \times 100}{81\cdot10} &= \text{fr. } 25\cdot154 \\ + \text{ three months' interest @ 4 \%}, &\frac{254}{\text{fr. } 25\cdot408} \end{aligned}$$

Comparing the arbitrated price of bills on Paris three months, = 25·408, with the quotation in London, = 25·45, it would appear to be profitable to buy bills on Paris in London, and sell them in Hamburg; and that therefore, in this instance—

In order to transfer money from London to Hamburg, remittances on Paris would be preferable to direct remittances; and—

In order to transfer money from Hamburg to London, direct remittances would be preferable to remittances on Paris.

The arbitrated par of exchange between Hamburg and London upon the same quotations is thus calculated:

The question is: What is the arbitrated price of short bills on Hamburg in London through the quotations of Paris in both places?

The following chain arises :—

$$\begin{aligned} \text{M. short ?} &= \text{£1.} \\ \text{If } \text{£1} &= 25\cdot45 \text{ fr. } 3/\text{mo.,} \\ \text{Francs } 3/\text{mo. } 100 &= 80\cdot29 \text{ M. short,} \\ \text{or } \frac{25\cdot45 \times 80\cdot29}{100} &= \text{M. } 20\cdot434. \end{aligned}$$

This calculation could also be made with the short French exchange. London quotes bills on Paris 3/mo. 25·45; short bills on Paris would therefore be 25·45, less three months' discount at the French rate (4 %), or  $25·45 - 0·254 = 25·196$ .

Hence the following formula:—

$$\begin{aligned} \text{M. short ?} &= \text{£1 sterling.} \\ \text{If } \text{£1} &= 25·196 \text{ fr. short,} \\ \text{and francs short } 100 &= 81·10 \text{ M. short,} \\ \text{or } \frac{25·196 \times 81·10}{100} &= \text{M. } 20·434. \end{aligned}$$

According to these two calculations the arbitrated par of exchange between London and Hamburg through the medium of Paris is 20·434, whilst the direct exchange is 20·40. It would therefore be profitable to sell bills on Hamburg in London, and procure marks by selling in Hamburg francs bought in London; and in this instance—

In order to transfer money from London to Hamburg, remitting bills on Paris would be preferable to remittances in direct bills; and—

In order to transfer money from Hamburg to London, remittances in direct bills would be preferable to those in bills on Paris.

In the first question the difference was between 25·45 and 25·40, or about  $\frac{1}{6}$  %; in the second it was between 20·434 and 20·40, or again about  $\frac{1}{6}$  %.

How many florins per £1 stg. will be made the arbitrated rate of exchange between Amsterdam and London by sight bills on Madrid bought in London at 48d. per duro, and sold in Amsterdam at 100 fl. for  $42\frac{1}{2}$  duros? *Ans.* 11·76 fl.

$$? \text{ florins} = (\text{£1}) 240 \text{ pence.}$$

$$48 = 1 \text{ duro.}$$

$$42\frac{1}{2} = 100 \text{ florins.}$$

If London is to receive from Amsterdam 490 florins when the course of exchange is  $12\frac{1}{4}$  florins per £1, required whether it will be more profitable to draw on Amsterdam direct, or



that Paris should draw on Amsterdam and remit to London. Exchange between Paris and Amsterdam,  $209\frac{1}{2}$  francs for 100 florins, and between Paris and London, 25·42 francs per £1, allowing  $\frac{1}{2}$  per cent. commission to Paris.

£ ? = 490 florins.	
100 = $209\frac{1}{2}$ francs.	<i>Ans.</i> Indirect is more profitable.
25·42 = £1.	Indirect, £40 3 7½
100 = $99\frac{1}{2}$ being 100 less $\frac{1}{2}$ % com.	Direct,
	490 florins at $12\frac{1}{4}$ , 40 0 0
	<hr/>
	Profit, 3 7½

The exchange on St Petersburg was quoted on the Berlin Bourse, 22nd July 1890, at 238 per 100 roubles, and the short exchange on London at 20·43. What rate does this give between London and St Petersburg? *Ans.* 28 pence.

$$\begin{aligned}
 ? \text{ pence} &= 1 \text{ S. Ro.} \\
 100 &= 238 \text{ M.} \\
 20\cdot43 &= 240\text{d.} \\
 \hline
 &= 28\text{d.}
 \end{aligned}$$

What rate of exchange is established between London and Lisbon by bills on Paris bought in London at 25·65, and sold in Lisbon at 525 reis per 3 francs? *Ans.*  $53\frac{1}{2}$ d. per milreis.

$$\begin{aligned}
 ? \text{ pence} &= 1000 \text{ reis.} \\
 525 &= 3 \text{ francs.} \\
 25\cdot65 &= 240\text{d.} \\
 \hline
 &53\frac{1}{2} \text{ pence per milreis.}
 \end{aligned}$$

A Calcutta banker can buy a cheque on Paris at the rate of fr. 1·75 per rupee, which he sends for collection to Paris, instructing his agent to buy a draft on London which he effects at 25·50. How many pence does this yield per rupee? *Ans.* 16·47d.

$$\begin{aligned}
 ? \text{ pence} &= 1 \text{ rupee.} \\
 1 &= 1\cdot75 \text{ fr.} \\
 25\cdot50 &= 240.
 \end{aligned}$$

## ARBITRATIONS OF STOCKS AND SHARES.

Although the telegraph has done much towards making the whole world one market, yet frequently prices of Stocks and Shares are different on the same day in the several markets even of one country. On the Exchanges of foreign countries in which the moneys are distinct, and where the state of credit, rate of interest, political influences, and speculation vary from day to day, the quotations for a particular stock may at the same moment differ on the several Exchanges when the prices are reduced to grains of pure gold or some other common denominator. The comparing of these prices is called Arbitration, and dealings in stocks and shares to secure the profit that may result from buying in one market and selling in another are called Arbitrage operations. Operators in this business require to have special knowledge of the market usages on the several Stock Exchanges. For example, certain stocks are quoted *ex coupon* in London a fortnight before they are quoted *ex coupon* abroad. Stocks and shares are usually quoted in London *inclusive* of accruing dividend, and on the Continent\* *without*, so that a buyer on a Continental bourse must, in addition to the price, pay accrued interest to the seller. International indebtedness is often liquidated by exporting securities; and to enable a merchant to judge whether it will be profitable to provide a fund in a foreign country by buying-in stock in his country and selling it in the foreign country, rather than by purchasing a draft payable in the foreign country, he must make the necessary calculation, taking all the factors into account. The following are simple illustrations:—

What is the highest price that can be given in London, without allowing for brokerage, for the following Stocks to be sold in Paris at the prices quoted, on Saturday, 13th December 1890, when cheque Exchange on Paris 25·30?

\* In Brussels and Paris the prices quoted are inclusive of accruing interest as in London.

I. For Portuguese stock to be sold in Paris at 58. Fixed exchange 25·25.

£ ? = f.2525 or £100 stock.

100 = 57·73. (Paris quotation 58, less stamp 18 cents.  
Carriage and insurance, 9 cents.)

25·30 = 1.

*Ans.* 57·61 or  $57\frac{5}{8}$  London price, from which must be deducted buying and selling brokerage if brokers are employed.

II. For Spanish stock to be sold in Paris at 75·50. Fixed exchange 25·20.

? = f.2520 or £100 stock.

100 = 75·20. (f.75·50, less stamp 18 cents., and carriage and insurance 12 cents.)

25·30 = 1.

*Ans.* 74·90, or  $74\frac{2}{3}\frac{9}{2}$  London price.

III. Turks IV. to be sold in Paris 18·60. Exchange 25 (Stock Exchange par).

? = 2500.

100 = 18·39. (18·60, less stamp 18 cents. Carriage and insurance 3 cents.)

25·30 = 1.

*Ans.* 18·17, or  $18\frac{3}{16}$  in London.

IV. Egyptian Unified to be sold in Paris at f.485 per £20 stock. Exchange par.

£ ? = 100 £.

20 = 483·50 f. (485, less stamp in Paris 18 cents %.  
Expense 12 cents %.)

25·30 = 1.

*Ans.* 95·55, or  $95\frac{9}{16}$  in London.

The four preceding examples indicate the rough and ready method adopted by foreign dealers to arrive at the London equivalents of foreign quotations. In the case of stock bought in London for sale in Paris, the British stamp must be considered, not the French.

The price of Egyptian Unified Stock is sent over from Paris as 485 when the London quotation is 95. Is there any margin on which to act ?

# 28 NOTES ON MONEY, FOREIGN EXCHANGES, AND PRICES.

$f.485$ per £20 bond = $f.2425$ per 100.	$2425 \div 25 \cdot 30$ .
(the cheque rate of exchange) gives the London equivalent of the	
Paris price,	95·85
From which must be deducted insurance and carriage and	
French stamp duty and brokerage,	·38
	<hr/>
	95·47

or  $95\frac{1}{2}$ , so that there is nearly  $\frac{1}{2}$  % margin on which to act between the two markets.

On a quotation of Portuguese 3 per cents. from Paris, £2000 are bought in London at 57, and resold in Paris at 58. What is the profit on that transaction?

£2000 @ 57, cost	£1140	0	0
Insurance and expenses, say	1	5	0
	<hr/>		
	£1141	5	0
£2000. @ fixed exchange $f.25 \cdot 25 = f.50,500$			
@ 58, realised	$f.29,290$		
Less—French stamp duty and brokerage,	112	35	
	<hr/>		
	$f.29,177 \cdot 65$		
equal at cheque exchange of $25 \cdot 30$ to	£1153	5	4
Thus showing a profit of	12	0	4

On 15th November 1890 Union Pacific Railway shares are bought in Amsterdam at  $47\frac{1}{2}$  and sold in London at 50 (for settlement 30th November). What is the turn on the transaction?

100 Union Pacifics @ \$47 $\frac{1}{2}$ ( $2\frac{1}{2}$ fl. to the \$),	fl.11,875
Interest 6 %, November 16 to November 30,	27·30
Postage and insurance,	10·40
Exchange of Dutch to English certificates, $\frac{1}{4}$ %	
on \$10,000, or fl.25,000,	62·50
	<hr/>
Cost,	fl.11,975·20
Equal at sight exchange of fl.12·10 cents to £1 to	£989 13 8
100 Union Pacifics sold in London at \$50 and 4/	
per \$,	£1000 0 0
Less—Stamp duty,	1 0 0
	<hr/>
Realised	£999 0 0
Profit on transaction,	£9 6 4

On 15th November 1890, 100 Chicago, Milwaukee, and St Paul shares are bought in London at  $53\frac{1}{2}$  (for settlement 30th November) and sold in New York at  $52\frac{1}{8}$  (for settlement next day). What is the profit on the transaction?

100 Milwaukees bought in London at $53\frac{1}{2}$ and 4/	
per \$,	£1070 0 0
Insurance, &c., say	1 5 0
Cost,	<u>£1071 5 0</u>
100 Milwaukees sold in New York @ $52\frac{1}{8}$ ,	\$5212·5
Interest at 5 %, November 16 to December 8th (the date when the stock arrives from London for delivery),	15·7
Realised	<u>\$5228·2</u>
Equal at sight exchange of \$4·8225 per £ to	£1084 1 9
Profit on transaction,	<u>£12 16 9</u>

In the following examples allowance is made for brokerage.

If Lombard Railway Shares are quoted in Paris at  $f.505\cdot50$ , and in London  $19\frac{7}{8}$ . French brokerage, 50 centimes per share; London charges, 2s. 6d. per share. Find the arbitrated rate of exchange.

? Francs = £1.

$(19\frac{7}{8} + \frac{1}{8}) 20 = 1$  share in London.

Share in Paris 1 =  $f.505$  (being  $f.505\cdot50 - 50$  centimes).

= Ans.  $f.25\cdot25$  per £.

Egyptian Unified Stock was quoted in Paris 18th September 1890 at  $f.495$  per  $f.500$  stock, and in London at  $97\frac{1}{4}$  per cent. French brokerage, 50 centimes per share; London commission,  $\frac{1}{2}$  per cent. What is the arbitrated rate?

? Francs = £1.

$(97\frac{1}{4} + \frac{1}{2}) 97\cdot75 = £100$  stock.

£1 =  $f.25$  by stock exchange practice.

$500 = 494\cdot50$  ( $495 - 50$  centimes).

= Ans.  $f.25\cdot29$  per £.

### 30 NOTES ON MONEY, FOREIGN EXCHANGES, AND PRICES.

Indian 4 per cent. rupee paper being quoted in London, September 1890, at  $86\frac{3}{8}$ , and in Calcutta at  $101\frac{1}{2}$ , what would it cost per rupee to lay down 1000 rupees in Calcutta, brokerage there being  $\frac{1}{16}$  per cent., in London  $\frac{1}{8}$  per cent.? The buyer in London pays accrued interest at rate of 2s. per rupee.

*London cost—*

Rupees 1000, at $86\frac{3}{8}$ , . . . . .	£86	7	6
Brokerage, . . . . .	0	2	6
Interest 3 months at 4 per cent. and 2s. per rupee, . . . . .	1	0	0
	<hr/>		
	£87	10	0

*Return on sale in Calcutta—*

Rupees 1000, at $101\frac{1}{2}$ , . . . . .	Rupees 1015
Interest 4 months to date of sale, . . . . .	13·33
	<hr/>
	Rupees 1028·33
Deduct Brokerage, . . . . .	·63
	<hr/>
	Rupees 1027·70

? pence = 1 rupee.

Rupees 1027·7 = £87·5.

1 = 240 pence.

*Ans.*  $1/8\frac{1}{2}$ d. per rupee.

## PRICES.

Price is value measured in terms of money. ‘The value of a thing is what it will bring,’ and that expressed in money is ‘price.’ Merchants and manufacturers find that prices do not correspond with the cost of production, plus a percentage addition for profit. At the same time, they, like retailers, make their calculations of prices on the basis of cost of production plus percentage profit, and grumble or rejoice internally as prices fall below or rise above this.

Cost of production includes the prime cost (that is, the cost of the raw material used and of the wages paid) plus the

supplementary cost (that is, the general charges, wages of superintendence, rent, interest, &c.). The statement of accounts, so as to provide in a systematic and easily accessible form the data for these calculations, shows the bookkeeper's skill. The trader or manufacturer requires to know the price which will return him the prime cost and the price which shall also cover the supplementary cost and yield a profit. In bad times he may prefer to sell at about prime cost rather than stop work—which would injure his work-people and their dependants, and might have serious ulterior consequences on his own business. These fixed charges, or a considerable part of them, continue, whether the work is silent or going. The manufacturer therefore loses by selling under cost of production, but he might lose still more if he ceased to produce.

A merchant buys when he sees that he can dispose of the goods at a profit. He often requires, however, to hold stocks; and while he aims at having a profit on every portion of his stock, it frequently happens that prices vary so much that he may have to sell under actual cost. In such cases the moving consideration is the price at which he can buy at the time of the resale. In a simple manufacture, such as bleaching, a rate is fixed which is sufficient to pay for the cost of chemicals, wages, and general charges, and to yield a fair profit. The bleacher may also deal in the article, buying it in the natural state and selling it bleached. Time elapses between the purchase and resale, during which prices may alter. In selling the bleached goods the bleacher considers chiefly, not what he paid for the actual raw goods which he is sending out bleached, but what he could at the time of the sale replace them for. If he can realise a price which covers the price current for the raw goods at the date of selling the bleached goods, plus bleaching rate, he prefers to sell and buy in again to keep his work going, if his capital does not admit of his holding a stock of finished goods.

The same general principle applies in foreign trade. In fixing his price for buying or selling, the merchant has regard to the

rates current at the moment, viz., the prices in the markets at home and abroad—the rates of freight and the rates of exchange; and the question that presents itself to his mind is usually either—What can I give for the article abroad so as to realise a profit on its sale here? or, What price must I get for the article abroad so as to secure a profit on its purchase here?

### PRICE ARBITRATIONS.

If all countries used the same standard money and weights and measures, prices could be easily compared, and the charges, allowances, and cost of transit, and rate of exchange would be the only considerations requiring attention in calculating arbitrated prices.

The arbitrated cost price is what may safely be given for the goods, so that they may be realised without loss at the given selling price. The arbitrated selling price, on the other hand, is the lowest price at which an article can be sold so as to cover cost and charges.

In order to make these calculations it is necessary to have an acquaintance with the money, weights, and measures of the various countries, with their customs, tariffs, and market regulations, freights, &c.

What price per metre delivered can be given for silk so that it may be sold at 5s. per yard? Exchange 25·20.

$$?f = 1 \text{ metre.}$$

$$1 = 39\cdot371 \text{ inches.}$$

$$36 = 5/$$

$$20 = 25\cdot20.$$

$$= f6\cdot89 \text{ per metre.}$$

An invoice for lace received from Brussels, carriage paid, was charged per metre,  $f15^A$ ,  $f18^B$ ,  $f20^C$ ,  $f25^D$ , and  $f30^E$ , exchange 25·55. What are the arbitrated prices per yard?



$$\begin{aligned} ? \text{ £} &= (1 \text{ yard}) 36 \text{ inches.} \\ 1 \text{ metre or } 39\cdot371 &= f15. \\ 25\cdot55 &= 1. \end{aligned}$$

---

A	10/9
B	12/11
C	14/4
D	17/11
E	£1, 1/6.

In cases of this kind the constant multiplier is obtained thus :

$$\frac{36}{39\cdot371 \times 25\cdot55} = \cdot03578, \text{ which is then multiplied by the price in francs.}$$

What is the cost *ex* ship in Leith of flax bought in Riga at 4 roubles 80 copecks per pood delivered, when the exchange is 80·70 per £10? 63 poods = 1 ton.

$$\begin{aligned} ? \text{ £} &= 1 \text{ ton.} \\ 1 &= 63 \text{ poods.} \\ 1 &= 4\cdot80. \\ 80\cdot70 &= 10. \\ \frac{63 \times 4\cdot80 \times 10}{80\cdot70} &= \frac{48 \times 63}{80\cdot70} = \text{£}37, 9\text{s. } 5\text{d. per ton.} \end{aligned}$$

As a merchant may have to calculate the arbitrated cost price or selling price of the various articles in which he deals frequently, and as prices and rates of exchange vary, it is usual to prepare formulæ in which the constant factors are entered in the form of percentages, and a constant multiplier deduced, as shown above, to which the variable factors are applied as occasion arises.

The general formula for a cost price may be stated thus:—

$$\begin{aligned} 100 - \text{discount on cost} &: 100. \\ 100 &: 100 - \text{discount on gross sale price.} \\ 100 + \text{freight, \&c., rated on net cost} &: 100. \\ 100 &: 100 - \text{sale and warehouse charges} \\ &\text{rated on net sale price.} \end{aligned}$$

Where possible the discount and freights should be combined before estimating the percentage, and similarly the discount and sale charges. Where any of these are variable, however,

and separate percentages require to be used, it is necessary to exercise care so to state the percentages, that when combined they will give the same result as if the combination had been made before the percentage was ascertained. For example, if an article cost 500 rupees, and the export charges are 100 rupees, and discount 25 rupees, the export charges are 20 per cent. of the cost, and the discount 5 per cent. of the cost, together 15 per cent. or 75 rupees, making the gross cost 575 rupees.

By the formula stating the discount separately.—

$$100 - \text{discount} = 95 : 100.$$

100 + export charges rated on *net*

$$\text{cost, i.e., Rs. 100 on Rs. 475} = 121.05 : 100.$$

Being worked out this gives the proper result—115 : 100. If instead of 121.05 there had been inserted 100 + export charges rated on gross cost or 120, there would have resulted 114 : 100, which is incorrect.

A flax spinner has a sample of flax which yields per cwt. 60 lbs. line, worth 5d. per lb., and 48 lbs. tow, worth 3d. per lb. (4 lbs. per cwt. being waste), the cost of hackling being £2 per ton. What is the highest price in Silver Roubles per Berkowitz of 10 Berkowitz to the ton that he can offer for this material in Russia, supposing the discount on cost to be 3 per cent., the export charges 5 per cent. on net cost, the import charges 3 per cent., and the exchange 24d. per S. Ro. ?

$$? \text{ S. Roubles} = 1 \text{ Berkowitz.}$$

$$10 = 1 \text{ ton.}$$

$$1 = 20 \text{ cwt. } \left\{ \begin{array}{l} (60 \text{ lb.} \times 5\text{d.}) + (48 \text{ lb.} \times 3\text{d.}) - 24\text{d.} \\ 1 = 35/ \quad \left\{ \begin{array}{ll} 25/ & 12/ \end{array} \right. - 2/ \\ 2 = 1 \text{ S. Ro.} \end{array} \right.$$

$$1 = 35/ \quad \left\{ \begin{array}{ll} 25/ & 12/ \end{array} \right. - 2/$$

$$2 = 1 \text{ S. Ro.}$$

$$(100 - \text{discount}) \quad 97 = 100.$$

$$(100 + \text{char. expt.}) \quad 105 = 100.$$

$$100 = 97 \text{ (100 - import charges).}$$

$$\text{R. c.}$$

$$\text{Ans. } 33.33 \text{ per Berkowitz.}$$

Find the highest arbitrated cost price in rupees per Factory Maund at which Bengal Indigo should be purchased in Calcutta so as to sell in London at 6s. per lb., and yield a profit of 20 per cent., 3 Factory Maunds = 2 cwts. Exchange 1s.  $4\frac{1}{2}$ d. per rupee; Calcutta shipping charges 5 per cent.; London sale charges  $7\frac{1}{2}$  per cent.; loss of weight 1 per cent. *Ans.* Rs. 236, 12a. 9p. per maund.

? Rupees : 1 Factory Maund.

3 : 2 cwt.

1 : 112 lbs.

1 : 72 pence.

72 : 60 with profit.

$16\frac{1}{2}$  : 1 rupee.

(100 + export charges) 105 : 100.

100 :  $92\frac{1}{2}$  (import charges deducted).

100 : 99 (waste deducted).

General formula for a selling price—

100 : 100 – discount rated on cost.

100 – discount on gross sale price . : 100

100 – landing and sale charges rated

on net selling price . : 100

100 : 100 + shipping charges rated  
on net cost price.

What is the arbitrated selling price per quarter of 492 lbs. in London of wheat bought in Jubbulpore at 20 seers per rupee (200 seers = 441 lbs. a.d.p.), the land carriage to Bombay being 30 per cent., and the shipping charges 25 per cent. on cost price, and the sale charges and allowances 10 per cent. on selling price? Exchange 1s.  $4\frac{1}{2}$ d. per rupee. *Ans.* 26/5 per quarter.

? pence = 1 quarter.

1 = 492 lbs.

441 = 200 seers.

20 = 1 rupee.

1 =  $16\frac{1}{2}$  pence.

100 =  $(100 \times 30 \times 25)$  155.

(100 – 10) 90 = 100.

What is the arbitrated Bombay selling price of  $8\frac{1}{4}$  lbs. grey shirtings bought in Manchester at 4s.  $8\frac{1}{2}$ d. per piece net; export charges 3d. per piece; import charges 1 anna per piece; exchange  $1/5$ .

$$\begin{aligned} ? \text{ rupees} &= 1 \text{ piece.} \\ 1 &= 59\frac{1}{2} \text{ pence.} \\ 17 &= 1 \text{ rupee.} \\ &\text{Rs. 3, 8a.} \\ \text{Import charges} &\quad 1 \\ \hline \text{Ans. Rs. 3, 9a.} \end{aligned}$$

Find the arbitrated selling price in London of coffee bought in the East Indies at 70 Rs. per cwt. f.o.b. Shipping charges 4 per cent. on cost; discounts and sale charges 4 per cent. on sale price; exchange 1s.  $4\frac{1}{2}$ d. per rupee. *Ans.*  $104/3$  per cwt.

$$\begin{aligned} ? / &= 1 \text{ cwt.} \\ 1 &= 70 \text{ Rs.} \\ 1 &= 1/4\frac{1}{2}. \\ 100 &= 104 \text{ (with export charges).} \\ (100 - \text{sale expenses}) \quad 96 &= 100. \\ &= 104/3. \end{aligned}$$

What is the arbitrated selling price per cwt. in Liverpool of nitrate bought in Valparaiso (Jan. 1886) at \$3.15c. per quintal of 100 lbs. Spanish f.o.b.; current freight,  $26/3$  per English ton of 22 quintals Spanish, or 17 per cent. on cost; the exchange ruling  $26\frac{3}{8}$ d. per dollar? Liverpool charges, profit, loss of weight, insurance, &c., 20 per cent. on selling price. *Ans.*  $11/1$  per cwt.

$$\begin{aligned} ? \text{ shillings} &= 1 \text{ cwt.} \\ 20 &= 1 \text{ ton, Liverpool.} \\ 1 &= 22 \text{ quintals.} \\ 1 &= \$3.15c. \\ 1 &= 2/2\frac{3}{8}. \\ 100 &: 117. \\ 80 &: 100. \end{aligned}$$

# COST OF PRODUCTION.

The varieties of mercantile calculations of cost of production are endless. Each separate business has its own peculiarities, and each individual has his own ideas as to classification of items of cost. One or two simple examples may serve as types, and as guides to the understanding of the elaborate cost sheets in use in large mining and manufacturing concerns.

*Flax Dressing.*—During a particular period 8000 cwts. were hackled. The cost being as follows:—

	Cost of 400 tons.	Cost per cwt.	
		Pence.	£
Wages, . . . . .	£544	16·32	·068
Rent, Taxes, &c., . . . .	100	3·	·0125
Coal, Gas, Oil, &c., . . .	26	·78	·00325
Depreciation and Interest,	30	·9	·00375
	£700	21d.	·0875
Cost per cwt., . . . . . 1s. 9d.			

The exactness and simplicity of the decimal system is well illustrated in this example. It would be found very tedious to express the results in shillings, pence, farthings, and vulgar fractions. Pence and decimals of a penny are usually employed.

The usual hackling rate of 2s. per cwt. would yield a profit of  $12\frac{1}{2}$  per cent. upon the return of 2s., or  $14\frac{2}{7}$  per cent. upon the cost of 1s. 9d.

*Flax Spinning.*—A spinner bought flax at £31, 10s. per ton delivered. He paid £2 per ton for hackling, and as his yarn will be subject to 3 per cent. discount, while he pays cash for the raw material, he estimates the discount and interest at £1 per ton.

The cost then is—

	Per ton.
Flax, . . . . .	£31 10 0
Hackling, . . . . .	2 0 0
Difference in terms of purchase and sale,	1 0 0
	<hr/>
	£34 10 0

Or 34s. 6d. per cwt.\*

This material yields per cwt., after allowing 4 lbs. for waste—

60 lbs. line worth 4½d. per lb., . .	£1 2 6
48 lbs. tow " 3d. " . .	0 12 0
	<hr/>
	£1 14 6

The cost of spinning is ascertained thus. Suppose the number of spindles spun in a certain period to be 240,000, and that the costs are as follows:—

	Cost of Spinning 240,000 Spindles.	Cost of Spinning 1 Spindle— in Pence.
Wages, . . . . .	£2400	2·4
Rent, Taxes, and Insurance, . .	500	·5
Coal, Gas, Oil, &c., . . . . .	75	·075
Mill Stores, . . . . .	225	·225
Charges, . . . . .	200	·2
Depreciation and Interest, . .	400	·4
	<hr/>	<hr/>
	£3800	3·8
Margin for sundries, . . . . .	200	·2
	<hr/>	<hr/>
	£4000	4 pence.

The various items of cost may be classified in as much detail as may be thought necessary in each case. The object is to provide data for comparison of period with period, and of cor-

\* Consider here the advantage enjoyed by those countries which have a consistent system of currency weights and measures over this country and India, which have only accidental illustrations of the great benefits of complete systems like the French. In India there happen to be 16 annas in a rupee, and 16 chittaks in a seer, so a quotation of so many rupees per seer is the same in annas per chittak.

responding periods of different years one with another, so as to afford to the principal a means of check upon the efficiency of the management.

The spinner spins the tow into  $3\frac{1}{2}$  lbs. yarn, and out of each 100 lbs. of material, costing 3d. per lb., he obtains 75 lbs. of yarn, 25 per cent. being waste.

$\frac{300}{75}$  pence = 4d. is the cost of each lb. of yarn after allowing for waste.

$3\frac{1}{2}$  lbs. is the weight of each spindle.

---

14d. is the cost of  $3\frac{1}{2}$  lbs.

4d. is the cost of spinning.

---

18d. is the cost of  $3\frac{1}{2}$  lb. yarn per spindle.

Or by another method—

300 pence is the cost of 100 lbs. of raw material.

100 lbs. – 25 lbs. waste = 75 lbs., which gives  $21\frac{3}{4}$  spindles of  $3\frac{1}{2}$  lb. yarn.

Material for each spindle costs  $\frac{300}{21\frac{3}{4}} = 14$ d.

Add for spinning, . . . 4d.

Per spindle, 18d.

## STATISTICS OF PRICES.

In the construction of tables of statistics the main point is to have a clear conception of what the table is to represent, and what it is to exclude. It is next required that a descriptive heading be chosen which shall convey, in unmistakable language, what the table sets forth.

To form a table of the quantities sold and average price per quarter of British corn, imperial measure, during each week, arrangements must be made to procure returns from Inspectors and Officers of Excise, or others, of the sales in every market of wheat, barley, and oats.

The material for these returns is found in the market records of each sale in the following way:—

Wheat	50	quarters	at	30s.	=	1500s.
"	64	"		31s. 6d.	=	2016s.
"	54	"		32s.	=	1728s.
<hr/>						
Quantity	168	quarters.	Value	=	5244s.	

1 quarter = 31s. 2·57d.

All these separate returns and averages are again brought together—each grain separately—and the average is again taken. The result is stated in the *Gazette*, thus:—

THE AVERAGE PRICE OF CORN, per Quarter (Imperial Measure),  
in England and Wales for the Quarter ended Michaelmas  
1890, conformably to the Act of 45th and 46th Victoria, cap. 37.

Wheat.		Barley.		Oats.	
s.	d.	s.	d.	s.	d.
34	4	26	9	19	4

COMPARATIVE STATEMENT showing the Quantities Sold and Average Price of BRITISH CORN, Imperial Measure, as received from the Inspectors and Officers of Excise, in the Weeks ended 4th October 1886, 1887, 1888, 1889, and 1890, conformably to the Act of the 45th and 46th Victoria, cap. 37.

Week ended	Quantities Sold.						Average Price.		
	Wheat.		Barley.		Oats.		Wheat	Barley	Oats.
	Qrs.	Bus.	Qrs.	Bus.	Qrs.	Bus.	s. d.	s. d.	s. d.
4th Oct. 1886,	67,461	6	58,905	7	13,479	1	30 0	26 9	17 8
4th Oct. 1887,	70,509	2	92,893	2	7,129	0	28 7	28 6	15 1
4th Oct. 1888,	60,534	0	18,116	1	4,346	5	30 7	29 1	16 3
4th Oct. 1889,	86,301	3	97,839	3	12,076	2	29 3	29 4	16 8
4th Oct. 1890,	102,437	2	97,946	3	21,235	3	31 2	29 5	17 5



In a similar way the yearly averages are obtained from the several quantities and respective average rates.

The rate is found at which the sum of the quantities would produce the same amount as the total summation of the individual sales. That rate is termed the average rate.

The arithmetical rule is:—Find the values of the several quantities, and divide the sum of the values by the sum of the quantities. A fallacious result would be obtained by summing up the fifty-two weekly average prices and dividing by 52, because that method takes no account of the varying quantities sold each week. A true average could be thus obtained only in the cases where equal quantities were sold in every week throughout the year, or where the price never varied.

If there be set down the daily quotations of the price of Silver for a whole year, and the sum of these quotations be ascertained and divided by the number of days, the result would not be the average yearly price, but the average of the daily quotations over that particular year.

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## PROPORTIONS.

The mode of expressing proportions, now almost universally adopted, is by percentages, which are found most convenient for comparison. For example, to compare profits earned, the simplest way is to reduce the figures to a percentage. Thus, if £1000 be earned on a capital of £20,000, that is 5 per cent., £540 on £9000, 6 per cent., and if both capital and profits vary, the rate of profit is obtained in a form suitable for comparison. So the expenses of companies, such as Life Assurance Companies, are reduced to a percentage on the premium income, or on the income from premiums and interest on investments, and one company is thus

compared with another. If the percentage be taken on the premium income only, injustice is done to an old company which has large invested funds, because the collection of interest revenue is not done without cost, and if it be taken on both premium and interest, injustice is done to a new company, as the getting of new business is much more expensive than the collecting of interest.

Another basis of comparison is so much per £, as in comparing taxation for local purposes, or so much per ton, as in cost of production of coal or iron.

Sometimes the form used is 1 in so many, as in statistics of death or disease. A death-rate of 20 in 1000 of the population, for example, is sometimes set down as 1 in 50 ; of 25 per 1000 as 1 in 40.

Regarding mean proportionals it is needful to distinguish between the arithmetical mean, which is the half of the sum of two numbers, and the geometrical mean, which is the square root of the product of the two numbers.

Thus the arithmetical mean of 4 and 16 is  $\frac{4+16}{2}=10$ , viz., *the average*.

The geometrical  $\sqrt{4 \times 16} = \sqrt{64} = 8$ , viz., *the mean proportional*.

If the geometrical mean be multiplied by itself, the result is the same as if the two numbers be multiplied together.

## GENERAL LEVEL OF PRICES.

Prices of particular commodities fluctuate and vary independently of one another. Trusts and speculators for the rise or fall select from time to time different articles for their operations. A change of fashion may raise the price of one article by increasing the demand for it. This may take place at the

expense of another article, which will fall in price on account of the lessened demand. So the discovery of new markets, the progress of invention, or new methods of production, or improved means of communication, or reduction in the cost of transport, may lower the price of articles, while new uses for a commodity, and the opening up of new markets, may raise the price. Similarly, all articles subject to the law of diminishing return, such as grain, tend in the long-run to rise in price, and the increasing demand of growing populations also affects prices in the same direction; but the increase of wealth, which is likely to outrun the increase in the circulating medium, makes for an ultimate lowering of the level of prices.

There are, however, certain circumstances connected with trade which affect the prices of all articles in a particular market, viz., circumstances connected with the state of credit. There are sanguine times of buoyant rising prices, and dull, depressed times when business is flat and prices are low.

There is, in addition, a cause which affects the prices of all commodities in most of the markets of the world at the same time and in the same direction. That cause is traced to the currency or circulating medium. In countries which have a gold monetary standard, prices are measured in gold. An article in Britain is quoted at the price of £5. That simply means that the price is  $(5 \times 123.274)$  616.37 grains of standard gold. Gold is a commodity, and its value is influenced by supply and demand, like the value of other things. Although gold is stationary at £3, 17s. 10½d. per oz., the variation in its value is apparent by its commanding at different times more or less of other things.

If, then, the supply of gold be greatly increased, there will be a tendency in the direction of lowering its purchasing power, and of increasing the prices of all articles in gold standard countries. It requires, however, a very extraordinary increase in the supply to affect prices, because the stock of gold is not used up or consumed, and is enormous compared with the annual supply. This condition is illustrated by the state of prices in

Britain after the great increase in the gold supply consequent on the Californian and Australian gold discoveries.

If, on the other hand, a great demand should arise for gold, the scarcity of gold would manifest itself by an increase in its purchasing power—by a lowering of *all prices*. This was exemplified by the course of prices after 1873, when Germany demonetised silver and adopted the gold standard, followed by the Latin Union suspending the free coinage of silver, by the Scandinavian countries and Holland taking to the gold standard in place of silver, and by the United States and Italy requiring gold with the view of resuming specie payments. It is now generally admitted that the increased monetary demand for gold was at least a factor in producing the low prices which ruled during the period of trade depression following 1873.

Attempts have been made to determine the extent of the alterations in the general level of prices, and the method of accomplishing this will now be explained.

The Board of Trade returns supply information as to the quantities and value of the imports and exports of produce. Other Parliamentary returns supply similar information as to the home production of many articles.

If, then, a table be prepared of the quantity and value of a large number of articles, the rate per unit of each can be determined, and at various periods similar tables can be prepared and the rates at each period ascertained. The quantity of each article consumed in the period under investigation may then be multiplied in succession by the rates ascertained for the different periods, and the results will show what the same quantities would have cost in previous periods at the prices then ruling. The following table, from Mulhall's *History of Prices*, is intended to show the comparative values at the different periods of the quantity of produce annually consumed in the world from 1881-4:—

Millions sterling.					
	1841-50.	1851-60.	1861-70.	1871-80.	1881-84.
Grain, . .	1419	1724	1658	1547	1326
Meat, . .	560	628	661	747	830
Hardware, . .	576	525	504	593	384
Dairy Products, .	236	266	303	333	340
Cotton Goods, .	386	335	484	346	302
Woollen Goods, .	263	245	280	268	223
Timber, . .	428	338	338	301	273
Coal, . .	224	241	241	241	189
Leather, . .	218	202	212	188	184
Potatoes, . .	115	125	154	164	181
Wine, . .	86	105	111	111	130
Raw Cotton, .	76	85	183	101	87
Wool, . .	160	145	125	97	83
Books, . .	120	115	105	87	79
Silks, . .	68	82	104	88	73
Linens, &c., .	77	74	78	74	70
Sugar, . .	106	100	106	84	61
Coffee, . .	23	30	38	50	42
Tobacco, . .	29	44	53	38	37
Tea, . .	16	20	24	21	16
Total, .	5186	5429	5762	5479	4910
Percentage valuation, . .	100	104·7	111·1	105·7	94·7

The general result is that £49, 2s. would have purchased as much in the period 1881-4 as

£54 15 9	in	1871-80.
57 12 5	"	1861-70.
54 5 9	"	1851-60.
51 17 2	"	1841-50.

## INDEX NUMBERS.

Another method of comparing general prices is that known as Index Numbers. These were introduced by Mr Porter in his book on the 'Progress of the Nation' in 1840, and have since become widely quoted, owing chiefly to the prominence given to them in the comparison of prices of wholesale commodities in the Annual Commercial Review in the *Economist* newspaper. The datum line was fixed at the prices ruling in 1845-50. Twenty-two sets were selected out of the forty-seven articles quoted, and the average price for these five years was ascertained for each set. Then, whatever this average price might be, 100 was entered in the table opposite the element, so that the total index number for the 22 elements was stated at 2200 for the five years 1845-50.

Now, suppose one of the articles in 1845-50 had an average price of 50s., and in 1851 80s., then the index number for that article in 1851 would be 160, because 50 is to 100 as 80 is to 160. The price in 1873 having risen to 100s., the index number is 200.

If, in 1887, the price of the same article had been 40s., the index number in 1887 would have been entered as 80.

Thus the index number consists of two parts—the one being the statement of the price of a particular thing for a series of years in the form of a percentage on the price of a particular year taken as the datum line. The first step in making an index number, then, is to substitute for the expression of a price of an article, whatever the quotation may be, a sum of 100, and then work out the index numbers of all the other prices by the proportion.

As the quotation at the datum line is to 100 (the index number at that time), so is the price at any other given time to the index number then.

Then the second step is to sum up the index numbers of all

the articles into one general index number, the expectation being that the variations in the movements of prices of all the items will be averaged in the aggregate, so that an average rise or fall in prices of articles will be shown. For example, let four articles—iron, copper, tin, and lead—be taken at one period, and the aggregate index number be called 400, at the next period they work out at 141, 105, 171, 124, and the addition of these is 541. It may be said the average price of these four metals has changed, as 400 to 541, but it must be noticed that this differs from the change in each particular article.

The most serious objection that has been made to the formation of index numbers in this way is, that it takes no account of the relative importance of the commodities which enter into the result. This has been recognised, and allowance made in various ways by different statisticians. Mr Jevons, for instance, took cotton in three different forms, thus tripling its weight in the elements (about 40 in number), which he dealt with; while the *Economist* introduces four cotton items into its table of 22 elements. Mr Robert Giffen, however, has assigned a relative importance to the different articles upon a definite principle. He ascertains what proportion each article bears to the whole trade, and assigns a proportionate number to it as indicating its relative importance.

The idea is that if there be, as in the *Economist* table, 22 component elements of the total index number, then each element as treated by the *Economist* counts for an equal weight in the scale, whereas one article, wheat, may, judged by the amount consumed, have an importance 82 times that of another—indigo.

The *Economist* has all along pointed out this fault in these words:—‘The “total index No.” does not, of course, present a full and accurate representation of the variations of prices, inasmuch as it cannot allow for the relative importance of the different articles.’ The remedy is to ascertain from

the returns of imports and exports, and otherwise, the amounts consumed annually of each element. The following are extracted from a table applicable to the year 1885 showing the consumption of

Indigo in Britain to have been,	. . . . .	£600,000
Wheat and Flour,	. . . . .	49,360,000
Cotton,	. . . . .	31,600,000
Meat,	. . . . .	63,000,000

and so on for the 22 articles as detailed on page 49, right-hand columns, the total trade of 1885 being nearly £265,000,000.

Having 22 elements you state the proportion thus:—As the grand total trade is to the amount of the trade in the particular commodity, so is 22 to the figure representing the relative importance of that commodity. Thus:—

Indigo,	265	:	·6	:	22	:	·05.
Wheat,	265	:	49	:	22	:	4·1.
Cotton,	265	:	31	:	22	:	2·63.
Meat,	265	:	63	:	22	:	5·24.

The ordinary Index Numbers are then in turn multiplied by the figure representing the relative importance, as in last column, table, page 49.

Mr Soetbeer, again, deals with 114 articles (100 of which are Hamburg articles). He divides them into several large groups into which he places different numbers of articles, so that each group may have equal relative importance. He gives an index number for each group, and then arrives at the final index number by aggregating the separate groups.

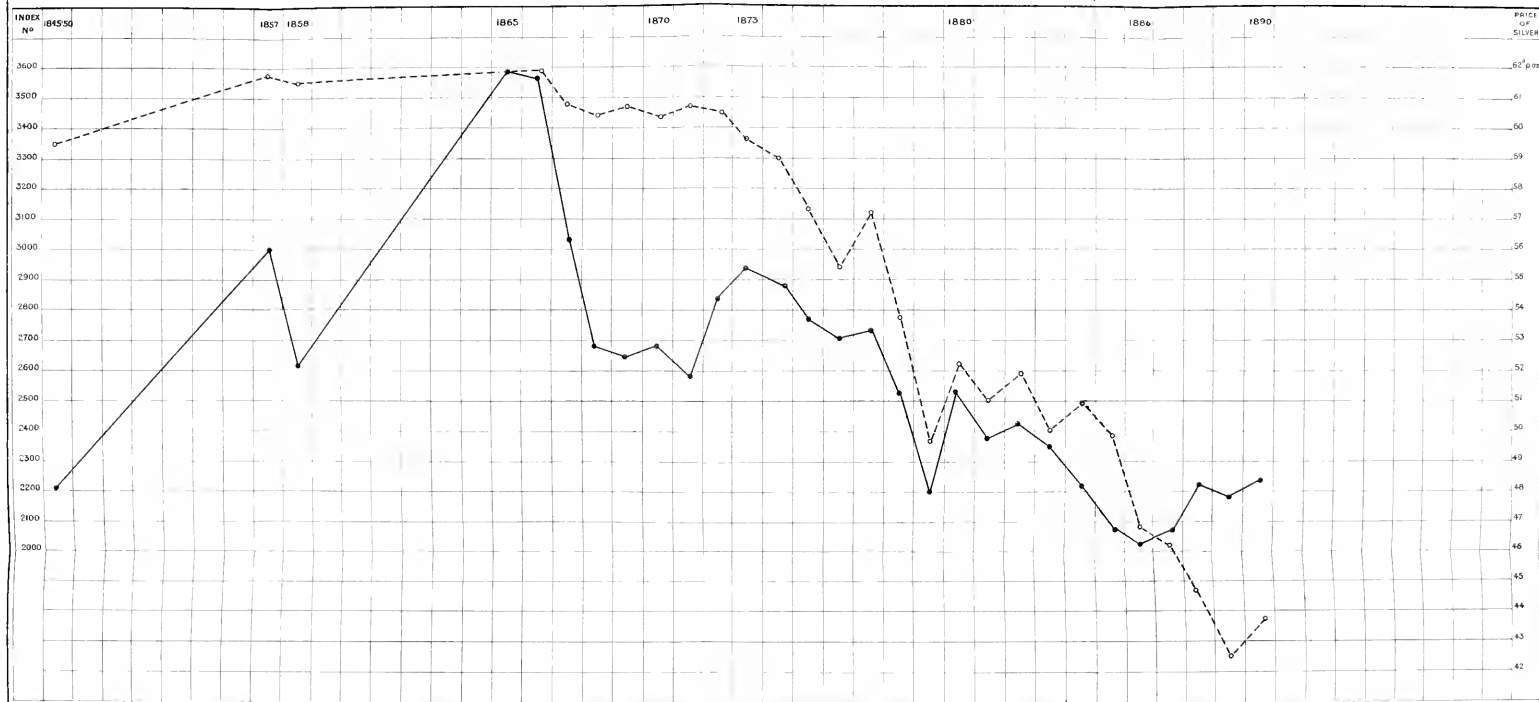
The data for price statistics require careful selection by specialists, the sources of danger lying chiefly in the changes in trade customs, local weights and measures, and variations in the quality of the same brand from period to period.

The graphic method of representing the course of prices by a curve, rising and falling with the prices, is also very suitable for the treatment of index numbers. The diagram on page 49 will serve to illustrate the method.



DIAGRAM SHOWING PRICES ON 1<sup>st</sup> JANUARY ANNUALLY OF COMMODITIES (ACCORDING TO THE ECONOMIST INDEX NUMBERS) AND THE PRICE OF SILVER.

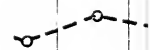
*The Dotted line represents the prices of Standard Silver in London on 1<sup>st</sup> January of each year and the continuous line the Index numbers*



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The following TABLE is based upon data derived chiefly from the *Economist*, *Commercial History and Review*, 1889, showing Wholesale Prices of Commodities in London and Manchester.—Average Six Years, 1845–50; selected dates, 1873, 1880, 1886, and 1890.

The numbers first occurring under each date are average prices at these dates—the black numbers are the corresponding Index Numbers.

The *italics* in last column are corrected Index Nos. for 1890, giving effect to relative importance on the basis of consumption 1885.

	1845 to 1850.	1873, 1st January.	1880, 1st January.	1886, 1st January.	1890, 1st January.	Consumption 1885, in thousands.	Relative Import- ance.	Corrected Index No. 1890.
Coffee, . . . . .	49/-	100	171	151	91/-	930	·08	15
Sugar, . . . . .	29/- to 42/6	100	74	70	12/3	17,920	1·49	62
Tea, . . . . .	9½d.	100	100	141	5½d.	8500	·71	44
Tobacco, . . . . .	4½d.	100	195	180	10d.	3500	·29	64
Wheat, . . . . .	53/-	100	104	88	29/10	49,350	4·10	230
Butcher's Meat, . . . . .	3/5½	100	144	119	4/3	63,000	5·24	644
Cotton, . . . . .	6½d.	100	132	110	5½d.			
Cotton Wool, Per-								
nambuco, . . . . .	8½d.	100	126	88	6½d.	31,600	2·63	230
Cotton Yarn, . . . . .	9½d.	100	154	110	9d.			
Cotton Cloth, . . . . .	13/5½d.	100	126	95	12/3			
Silk, Raw, . . . . .	11/6	100	169	135	10/9	1400	·12	14
Flax and Hemp, . . . . .	£38	100	98	78	£28, 17/6			
Sheep's Wool, . . . . .	15d.	100	157	117	£24, 10/-	23,000	1·91	176
Indigo, . . . . .	3/9	100	169	205	18d.	600	·05	6
Oils, . . . . .	£35, 16/8	100	118	106	4/6	5900	·49	40
Timber, . . . . .	72/-	100	127	105	£29, 7/6	19,650	1·64	189
Tallow, . . . . .	44/-	100	98	102	82/9	3340	·28	21
Leather, . . . . .	18d.	100	144	144	33/-	9600	·80	104
Copper, . . . . .	£88	100	105	81	23½d.	4680	·39	25
Iron, . . . . .	£8	100	141	92	£56, 5/-	18,000	1·50	163
Lead, . . . . .	£17½	100	124	112	£8½	1550	·13	11
Tin, . . . . .	£85½	100	171	109	£14½	1800	·15	18
Total Index Number,	2200	2947	2538	2023	2236	264,320	22	2056

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